VOLUME 6 *San Francisco Number* NUMBER 6

THE MEDICAL CLINICS OF NORTH AMERICA

MAY, 1923

Index Number

PHILADELPHIA AND LONDON
W. B. SAUNDERS COMPANY

COPYRIGHT, 1923, W. B. SAUNDERS COMPANY. ALL RIGHTS RESERVED
PUBLISHED BI-MONTHLY (SIX NUMBERS A YEAR), BY W. B. SAUNDERS COMPANY, WEST WASHINGTON SQUARE, PHILADELPHIA
MADE IN U. S. A.

MEDICAL LIBRARY
JUN 5 1952
UNIV. OF N. DAK.

CONTRIBUTORS TO THIS NUMBER

LEROY H. BRIGGS, M. D., Assistant Clinical Professor of Medicine, University of California Medical School; Visiting Physician, San Francisco Hospital.

EDWIN L. BRUCK, M. D., Assistant in Medicine, University of California Medical School.

JOSEPH CATTON, M. D., Clinical Instructor in Medicine, Stanford University School of Medicine; Visiting Physician, Stanford University Hospital.

MARSHALL C. CHENEY, M. D., Assistant in Medicine, University of California Medical School; Assistant Visiting Physician, Gastro-intestinal Clinic, University Hospital.

WILLIAM FITCH CHENEY, M. D., Clinical Professor of Medicine, Stanford University School of Medicine.

ERNEST C. DICKSON, M. D., Associate Professor of Medicine, Stanford University School of Medicine; Visiting Physician, Stanford University Hospital.

GEORGE E. EBRIGHT, M. D., Assistant Clinical Professor of Medicine, University of California Medical School; Visiting Physician, San Francisco Hospital.

ERNEST H. FALCONER, M. D., Assistant Clinical Professor of Medicine, University of California Medical School; Chief of Medical Clinics, University of California Hospital.

CLAIN F. GELSTON, M. D., Instructor in Pediatrics, University of California Medical School.

RICHARD W. HARVEY, M. D., Assistant Clinical Professor of Neurology, University of California Medical School; Visiting Neurologist, Neurology Clinic, University of California Hospital.

GORDON E. HEIN, M. D., Instructor in Medicine, University of California Medical School; Assistant Visiting Physician, San Francisco Hospital.

R. STEWART HIATT, M. D., St. Luke's Hospital.

WILLIAM J. KERR, M. D., Associate Professor of Medicine, University of California Medical School; Physician in Chief, University of California Hospital.

EUGENE STERLING KILGORE, M. D., Assistant Clinical Professor of Medicine, University of California Medical School; Physician in Chief, St. Luke's Hospital.

H. LISSER, M. D., Assistant Clinical Professor of Medicine, University of California Medical School; Chief of Endocrine Gland Clinic, University of California Hospital.

WILLIAM P. LUCAS, M. D., Professor of Pediatrics, University of California Medical School; Pediatrician in Chief, University of California Hospital.

HIRAM E. MILLER, M. D., Instructor in Dermatology, University of California Medical School; Assistant Dermatologist, University of California Hospital.

LAIRD M. MORRIS, M. D., Assistant in Medicine, University of California Medical School; Visiting Physician, Out-patient Department, University of California Hospital.

CHARLES E. NIXON, M. D., Instructor in Neuropsychiatry, University of California Medical School; Visiting Physician, Endocrine Gland and Neurological Clinics, University of California Hospital.

PHILIP H. PIERSON, M. D., Clinical Instructor in Medicine, Stanford University School of Medicine; Chief of Chest Clinic, Out-patient Department, Stanford University Hospital.

LANGLEY PORTER, M. D., Clinical Professor of Pediatrics, University of California Medical School; Visiting Pediatrician, University of California Hospital.

MISS C. C. PRINGLE, Technician, Stanford University Hospital.

J. MARION READ, M. D., Clinical Instructor in Medicine, Stanford University School of Medicine.

ALFRED C. REED, M. D., Associate Clinical Professor of Medicine, Stanford University Medical School; Visiting Physician, Stanford University Hospital.

HARRY SPIRO, M. D., Clinical Instructor in Medicine, Stanford University School of Medicine; Visiting Physician, Stanford University Hospital.

LAURENCE TAUSSIG, M. D., Instructor in Dermatology, University of California Medical School; Assistant Dermatologist, in charge of Radium Emanation Plant, University of California Hospital.

HARRY A. WYCKOFF, M. D., Instructor in Medicine, Stanford University Medical School; Clinical Pathologist, Stanford University Hospital.

6993

CONTENTS

THE MEDICAL CLINICS
OF
NORTH AMERICA

Volume 6 Number 6

CLINIC OF DR. WILLIAM FITCH CHENEY

STANFORD UNIVERSITY HOSPITAL

DIAGNOSIS OF GALL-STONES

WHEN recurring attacks of acute indigestion or of pain in the upper abdomen or chronic stomach trouble are prominent features in a clinical history we must not forget that gall-stones may be the cause. When patients seek relief from such complaints the only safe plan is to take a careful and complete history of their ailments; to go over every part of the body in a detailed physical examination; to carry out laboratory examinations of all sorts; and finally, to make *x*-ray examinations of the gastro-intestinal tract. If these things are done, after all the data are collected, it is usually easy to decide whether gall-stones do or do not cause the symptoms.

But the starting-point is the patient's story; and experience shows that gall-stones occur in four different groups of cases that can be distinguished by the account they relate of their symptoms. These are: (1) Recurring attacks of colic, with good health between; (2) recurring attacks of colic with more or less constant disorder of the stomach between attacks; (3) chronic stomach trouble with no severe pain, but subacute discomfort at times in the gall-bladder region; (4) chronic stomach trouble with no history pointing to the gall-bladder over long periods of time.

To illustrate how from this point of beginning we get together the evidence on which a diagnosis is based and the relative value

of our methods of investigation the following recent cases are presented:

Case I.—A man aged forty-eight complained of attacks of very severe abdominal pain. The first of these occurred about a year before, soon after a big dinner, and was attributed to "acute indigestion." It lasted about six hours, and left him very sore across the upper abdomen. Two months later he had a similar attack, also after a hearty meal, and lasting all of one night. These recurred at shorter and shorter intervals until for two months before he applied for advice he was in almost constant pain; and instead of coming once a week or once in two weeks his attacks would recur after every hearty meal. This pain was attributed by the patient to gas which "poked up" under the ribs on the right side and made him so sore there he could hardly bear it touched. Sometimes the pain was felt in the right side of the back opposite the pain in front or under the right shoulder-blade. There had been no disturbance of digestion except coincident with his attacks, and never any jaundice.

Physical examination was practically negative. The patient was a large, well-developed man, 6 feet in height and weighing 190 pounds. The thoracic organs were all normal, and the abdominal likewise, except for slightly greater resistance at the right costal margin than at the left. The Murphy maneuver was negative. All reflexes were present and active.

Laboratory examinations showed: *blood* Wassermann negative; hemoglobin 75 per cent., red cells 4,490,000, white cells 13,000, with polys. 65 per cent.; *urine* amber, clear, 1020, acid, no albumin, no sugar; *fasting stomach contents* 30 c.c. of clear fluid, no excess of mucus, no visible blood, but slight reaction for occult, no food retention, total acidity 20, free HCl 5; *fractional gastric analysis* after Ewald test-meal, with half-hour extractions, showed total acidity running 45, 50, 60, 65, and free HCl 26, 35, 35, 45; the *stool* was normal in color, form, and consistence, showed no gross or occult blood, no unusual food remnants and no excess of fat, no epithelial cells, no red or white blood corpuscles, no ova, parasites, or cysts.

Finally, the *x*-ray examination showed slight cardiospasm,

gastric hyperperistalsis, a flattened duodenal cap, high fixed hepatic flexure; and a rounded shadow in the region of the gall-bladder about 1 inch in diameter, with a central area of decreased density, this shadow lying in the central portion of the gall-bladder shadow, which was larger than normal and more dense than usually seen.

From this combination of history and *x*-ray findings there could be no reasonable doubt about the diagnosis. Even though physical examination or laboratory findings added no direct proof, they at least served to rule out other possible pathology. Operation was therefore advised. This showed a gall-bladder of normal appearance, non-adherent, but containing two large stones, with their opposing surfaces faceted and fitted snugly together; and, in addition, a considerable number of very fine stones, best described as bile-sand. Gall-bladder and contents were removed.

Case II.—A woman aged forty-eight sought advice because she had more or less constant indigestion for several years past, characterized particularly by gas and belching. She felt all the time that her stomach was bad, had to be very careful what she ate, and to avoid certain kinds of food she found produced more gas. She recalled also several severe attacks of what she called "indigestion." The first of these was six years ago; four or five had occurred in all, the last one several months before her consultation. These were all characterized by colic in the pit of her stomach; a pain that would grind, then let up, then come again; the attack lasting in each case for several hours. There was no nausea or vomiting accompanying these paroxysms and no jaundice following. Physical examination was entirely negative not only as regards the abdomen, but the entire body. A test-meal and gastric analysis were not permitted; but the blood-count was normal; the blood Wassermann negative; the urine showed no albumin or sugar, and the stool was normal in every respect. *x*-Ray examination showed no irregularity in the outline of stomach or duodenum, no delay in emptying of the stomach, the hepatic flexure only moderately high, and not

fixed; the cecum not tender to pressure; but there were five good-sized annular shadows in the gall-bladder region, distinctly shown in a slightly enlarged and somewhat thickened gall-bladder.

This patient declined operation and is waiting for another attack of colic to convince her that her dice-box ought to be removed.

Case III.—A large fat woman complained of indigestion off and on for years, but lately all kinds of food started it, and it was present nearly all the time. She had much eructation of gas and regurgitation of sour liquid after meals; with burning pain in the stomach going clear through to the back; distress and occasional soreness in the epigastrium, but no nausea or vomiting. She never had any attack of colic.

This patient was 5 feet, 6 inches tall and weighed 200 pounds. Her color was sallow and subicteric, but not that of jaundice. Except for these peculiarities nothing abnormal was found on physical examination, but the abdominal wall was so thick with fat that no satisfactory examination could be made of the organs beneath it.

Laboratory Examinations.—Urine showed a faint trace of albumin, no sugar, numerous pus corpuscles in the sediment, but no casts; the blood gave a hemoglobin percentage of 70, red corpuscles 3,909,000, white corpuscles 7400; Wassermann reaction negative; fasting stomach contents consisted of 50 c.c. of bile-stained fluid, much thick mucus, no blood, visible or occult, no food retention, total acidity 12, no free HCl; the fractional gastric analysis showed no free HCl present at any extraction during two hours, the total acidity running 10 to 15; the stool was of normal appearance, showed no fresh blood, no mucus, normal food residue, no red or white blood-corpuscles, no ova, parasites, or cysts.

x-Ray examination of the gall-bladder region showed a rounded shadow about 1 cm. in its greatest diameter, lying within a somewhat larger and more dense gall-bladder outline than usually seen, with walls probably somewhat thickened.

This patient accepted the advice given and had her gall-bladder removed. In it was found an ovoid, hard, slightly granular stone, about 1½ cm. in its largest diameter. Otherwise the bile was normal. The gall-bladder wall showed slight fibrous thickening.

Case IV.—A woman aged thirty-six complained of "stomach trouble" for about nine years. At the outset and for over five years she vomited right after eating any food that did not quite agree. No particular pain or distress preceded the vomiting, and the food came up much as it was eaten. She would vomit three or four times after a meal, a little each time, but never lost the entire meal. This would happen after one or two meals each day for about five years. About three years before her symptoms changed in character. She gradually ceased to vomit, but began to bloat more and more, and this annoyance had become steadily worse. She was distressed and distended all the time, but worse right after eating. There were frequent noisy eructations of gas and much was also passed by the bowel. She was always constipated, more obstinately during the past three years, and she feared there was some obstruction. No pain was ever experienced in the upper abdomen of any kind, but occasionally she had a sharp, throbbing pain in the right lower abdomen, which she thought must be in an ovary.

This woman was short, plump, of good color, and appeared well. Nothing was found on physical examination to explain her symptoms in head, neck, thorax, or abdomen, but there were old pelvic injuries due to childbearing; lacerations of perineum, with rectocele and cystocele, and of the cervix, with chronic cervicitis. The extremities and all reflexes were normal.

Laboratory examinations showed a normal urine; stool normal in every respect; negative Wassermann reaction both in blood and in spinal fluid; complete absence of free HCl in stomach contents, at all extractions during two hours, with total acidity never above 14.

x-Ray examination of the gall-bladder region showed a small oblong shadow below the liver margin, apparently a gall-bladder

about normal size. Included within this shadow was seen a small area of increased density, surrounded by an area of less marked density. This shadow within the gall-bladder measured about 2 cm. in diameter, and was apparently a large single stone.

This patient has not yet submitted to operation, so that final proof of the correctness of the diagnosis has not been afforded, but the *x*-ray film seems very clear and definite, and after careful search no other cause for her symptoms has been found.

Case V.—This case shows another side of the situation and proves "all is not gold that glitters." A woman aged fifty-four sought advice for stomach trouble. Her stomach had given much annoyance for a year, but she had been running down for two years and losing weight greatly. She had no appetite at all, sometimes soon after eating was terribly nauseated, but only gas came up, rarely lost her food. This nausea came after nearly every meal, even while she was eating, so that she could not put in another mouthful; and as a result she had lost weight from 115 down to 94 pounds. She never had any pain, but felt sore to the touch over the pit of her stomach. She always had had a stomach easily upset, would become nauseated riding on cars, and then would vomit; but the present condition was different from any that had gone before.

The patient was a small, frail woman, weighing only 90 pounds. There was no abnormality found in mouth or throat; teeth were all artificial; lungs and heart were normal; the liver was prolapsed and there was a long, narrow, tongue-like process extending downward as far as the level of the navel; great tenderness was found at the right costal margin, just at the usual site of the gall-bladder, but no palpable mass there or elsewhere in the abdomen.

Laboratory examinations showed the urine normal; blood-count: hemoglobin 68 per cent., red corpuscles 4,520,000, white corpuscles 4450; blood Wassermann negative; stool examination normal; fasting stomach contents were 25 c.c. of clear fluid, with no increase in mucus, no blood, visible or occult; total

acidity 6, no free HCl; fractional gastric analysis revealed no free HCl in any extraction, and total acidity never above 4—a complete achylia throughout two hours' observation; duodenal contents showed a few squamous epithelial cells, large strands filled with pus-cells, and bile-stained, a few micro-organisms; the biliary tract contents after infusion of magnesium sulphate solution showed a few squamous epithelial cells, many pus-cells scattered and in groups, a few micro-organisms. Cultures from this material showed a few colonies of hemolytic streptococci and many colonies of Gram-negative bacilli with the cultural characteristics of Bacillus coli.

x-Ray examination of the gastro-intestinal tract showed prolapse of the stomach, the lesser curvature lying 3 cm. below the level of the iliac crests; the tone of the antrum was definitely increased; the stomach began to empty immediately, although peristalsis was weak; the duodenum appeared normal; no abnormality was made out in the colon. The gall-bladder films all showed a faint rounded shadow, about 2 by 3 cm., which was interpreted as a large single gall-stone.

From the history, the physical examination, the achylia, the duodenal contents, and particularly the shadow shown by the *x*-ray films it seemed reasonable to conclude that there was a large single stone in the gall-bladder, causing reflexly the gastric disturbance. Operation was, therefore, advised. The findings at operation were as follows: "The gall-bladder seemed normal and contained no stone; but there were a few apparently fresh adhesions near the cystic duct, and one palpable, pea-sized lymph-gland next the duct; a large Riedel's lobe extended well below the costal margin; stomach and duodenum were normal; the cecum was very mobile, covered with filmy membrane containing many adventitious blood-vessels, appendix long, flexed into a hook on the posterior surface of the cecum, and completely surrounded by adventitious membrane." The gall-bladder and appendix were both removed. No cause could be found for the shadow that suggested a stone in the gall-bladder.

Bacteriologic study of the gall-bladder after removal showed no pus-cells and no bacteria in smears; culture showed a few

colonies of Staphylococcus albus and of small Gram-positive bacilli, but no growth of pathogenic bacteria in forty-eight hours.

This patient was seen again six months following her operation. She had gained 10 pounds in weight and in general was much better; but at times still had her desire to vomit, though only about once a week. Fractional gastric analysis once more showed complete achylia. She was given dilute hydrochloric acid after each meal, and a little later reported that this medicine had afforded her more relief than anything previously done for her. All nausea had disappeared.

With these case reports as a basis I would like to call attention to the following points:

1. **History** is of value in the diagnosis of gall-stones only when it includes characteristic attacks of pain, but these attacks vary greatly in details. If the description given is like that in Case I the diagnosis is practically made, but frequently the suffering is all experienced in the epigastrium and does not radiate to the right costal margin at all. It may radiate to the left costal margin, or up toward the heart, and thus suggest other disease than gall-stones; or down the right side of the abdomen toward the appendix, directing attention to that as the site of the real pathology. On the other hand, the peculiar features usually interpreted as meaning biliary colic may be closely imitated by syphilis of the liver, by the radiculitis of tabes, by diaphragmatic pleurisy, by angina pectoris, by renal stone or pyelitis, by appendicitis, by herpes zoster.

There is nothing about the gastric disturbances produced reflexly by gall-stones to identify their cause. For that matter there is no gastric disorder the history of which alone determines the underlying pathology. Any feeling of satisfaction that there is such an easy method of recognizing gall-stones by the kind of stomach trouble the patient describes soon disappears as experience increases. There is no way but hard work and painstaking examination of every possible sort to make success in diagnosis possible. Short cuts do not exist; and to trust one of any kind is dangerous.

2. **Physical examination** never gives any direct assurance that gall-stones are present. After an attack of biliary colic tenderness and resistance may be found in the right upper abdominal quadrant, but this proves nothing as to the presence or absence of gall-stones, and too much reliance must not be placed upon it. For long periods between attacks of pain nothing abnormal may be found; and if tenderness is elicited at the right costal margin there is more than one cause to be considered. The gall-bladder containing stones is usually smaller than normal and is rarely if ever palpable. An enlarged gall-bladder, therefore, suggests some complication, such as blocking of the cystic duct and fluid accumulation, or acute infection and pus formation, or carcinoma.

But the most careful and complete physical examination of the whole body is essential in every patient; not simply to prove whether gall-stones do or do not exist, but to discover what causes the symptoms of which the patient complains. Entirely negative findings not only in the abdomen, but in the rest of the body, are not inconsistent with the presence of gall-stones. But this is no excuse for negligence; and by careful search some abnormality may be discovered elsewhere than in the abdomen, as in the heart or over the root of a spinal nerve, that explains the history satisfactorily.

3. **Laboratory examinations** of all kinds are likewise indispensable. If one detail is overlooked, the cue to diagnosis may be missed. (*a*) Fractional gastric analysis after a test-meal tells whether secretion is disturbed, and in what way. The condition most often associated with gall-stones is achylia, but it is not always coincident, as shown by Case I, and when found it does not always mean gall-stones, as shown by Case V. Thus the evidence elicited by fractional gastric analysis is not conclusive in any way either for or against gall-stones, but neither is any other item when taken by itself. (*b*) Stool examination throws no direct light on the presence of gall-stones; but it tells much about whether other conditions exist that might cause not only dyspepsia, but pain at right costal margin, particularly if it shows ova or cysts or parasites, or pus or blood-corpuscles, or

excess of mucus. (*c*) Blood-counts also convey no direct proof for or against gall-stones, but if we omit them we may just by that neglect miss the diagnosis of pernicious anemia or of leukemia, or some other disease that is really responsible for the gastric symptoms. (*d*) The blood Wassermann reaction should be as much a routine part of every examination as a urinalysis. Any gastric disorder, no matter what account of it is given, may be due directly to syphilis of the stomach; or may be produced by changes in the liver due to syphilis; or may simply be a part of the systemic disturbance produced by syphilis, the only positive proof of which in any case is furnished by examination of the blood. (*e*) Urinalysis may show bile in excess when the skin or scleræ are not discolored; and so may suggest obstruction to the outflow and resorption of bile into the blood; but the main benefit urinalysis confers is the detection of chronic nephritis, or pyelitis, or nephrolithiasis, or diabetes, or some other disease that explains chronic disorders of the stomach or painful abdominal attacks, and so helps in eliminating gall-stones from consideration. (*f*) Spinal fluid: in certain dubious cases this alone can solve the diagnostic problem. Not only in the attacks of pain and vomiting long described as gastric crises but also in persistent disorders of digestion of almost any type, luetic disease of the central nervous system may be the only pathology; and this is recognized at once by changes in the spinal fluid after lumbar puncture. Increased number of cells, increased albumin content, Wassermann reaction in all dilutions, even when blood Wassermann is negative, may all be found if search is made; a search that should never be overlooked in any case where paroxysms of abdominal pain or chronic disorders of the stomach are otherwise unexplained. (*g*) Duodenal contents obtained in the fasting state or after the instillation of magnesium sulphate solution to stimulate hepatic secretion do not give as reliable information as was hoped. Particularly when the gall-bladder is filled by one or several large or by many small stones, there is no room left in it for bile. Frequently the bile obtained from gall-bladders removed at operation is normal in appearance and sterile in cultures even when stones are also

found. What reliable information can we expect to obtain from duodenal contents, therefore, to aid in the diagnosis of gall-stones? Surely it must be exceptional when assistance is thus derived.

4. ***x*-Ray films** promise much in this field, but they show only those stones that are calcareous. Pure cholesterin stones cast no shadows. Thus half the gall-stones, at best, fail to show on *x*-ray plates even when present in the gall-bladder; and probably more than half. More and more are being discovered due to better technic; but in a certain proportion of cases, probably over half, the failure to discover them cannot be interpreted to mean that they do not exist. On the other hand, once in a while a shadow that seems on *x*-ray films to be clearly a gall-stone proves at operation to be a delusion, as in Case V. But this happens less and less frequently with greater care and improved technic. On the whole, positive finding of gall-stone shadows is our best diagnostic proof, but the failure to find them does not mean that all other impressions obtained by history, physical examination, and laboratory aids must necessarily be incorrect. Even where no stones are seen, indirect *x*-ray evidence is furnished by increased antral tone, duodenal flattening or high hepatic flexure, that cholecystitis exists; and thus the inference is justified that stones may also be present. Finally, the claim is now made that gall-bladders definitely outlined on the *x*-ray films are thickened and diseased gall-bladders; and such may easily contain cholesterin stones, even though no shadows can be demonstrated.

In conclusion, a point that needs to be kept in mind is that frequently patients show gall-stones at abdominal operation or at autopsy, though they had never had any of the symptoms usually attributed to their presence. When suspicious symptoms do appear and then gall-stones are found by *x*-ray examination, are we always justified in assuming that there is a relation between the two? May not the gall-stones play no part in the clinical picture and the manifestations really be due to some other pathology? The final test is, of course, the results following operation for removal of gall-stones; but careful and thorough

investigation preceding operation is a more reasonable way to determine; and we must constantly avoid the tendency to accept the obvious and overlook the real explanation of a patient's disease.

CLINIC OF
DR. WILLIAM J. KERR
DR. EDWIN L. BRUCK

UNIVERSITY OF CALIFORNIA HOSPITAL

THE USE OF QUININ DERIVATIVES IN THE PREVENTION AND TREATMENT OF CARDIAC IRREGULARITIES

OUR interest in the quinin derivatives has been greatly stimulated in the past few years by the success achieved in treating auricular fibrillation with quinidin compounds. In general, the results have been quite uniform and gratifying. This has been particularly true where the drug has been employed soon after the onset of auricular fibrillation associated with mitral disease in young or middle-aged individuals. In many instances, however, the effects have been only temporary. Some fatalities have been reported from suspected embolism or ventricular fibrillation. Attacks of syncope have been described and ventricular tachycardia has been observed. In a recent contribution by one of us attacks of paroxysmal ventricular tachycardia and ventricular fibrillation with syncope were described following the use of quinidin sulphate in a patient suffering from auricular fibrillation and complete heart-block. That the patient recovered (and is still alive sixteen months later) was probably due to the temporary action of the drug. Such experiences have served to show the possible dangers of quinidin and to warn us against its indiscriminate use.

It is our purpose to present as examples 2 case reports in some detail, and to briefly mention others where quinin derivatives have been used with great benefit in intermittent abnormal mechanisms of the heart.

Paroxysmal Tachycardia Treated with Quinidin Sulphate and Quinin Dihydrochlorid Intravenously.—*Case I.*—Mrs.

H. T. P., aged forty-nine, who was referred by Dr. P. G. White, of Los Angeles, California, on September 26, 1922, complained of attacks of "palpitation" which began at the age of about seventeen years following "influenza." The attacks had been of a duration of a few minutes to two hours, with abrupt onset and cessation, with increasing frequency and duration up to the age of thirty-seven (twelve years ago), when there was a period of freedom from attacks for eighteen months. Ten years ago, after an operation, the attacks recurred in more severe form. The duration varied from six to thirty-six hours, with attacks weeks or months apart. During the past three or four years the attacks have been accompanied by anginal pains radiating to left shoulder and elbow, with numbness in the arms. Two weeks before examination the most severe attack was experienced, which lasted for ten hours with extreme anginal pain, sensation of pressure in chest, and radiating pain accompanied by swelling of the left arm, loss of consciousness, swelling of the tongue, and spasms of muscles of the extremities. When the attack ceased there was a relief of symptoms for two hours, when another attack came on, lasting for five hours. The heart rate was not known during these latter attacks, but upon previous examinations by Dr. White during attacks the rate had been about 180 or more per minute.

The past history was essentially negative for infections except for influenza in 1889–90 and in 1918, which in the first instance preceded the onset of the attacks described, and in the second instance was followed by the more severe attacks. There had been an operation for removal of a cystic breast many years ago. exploratory laparotomy was performed fifteen years ago for suspected tuberculous peritonitis. Eight years ago the gall-bladder had been drained. Menopause had occurred one year ago. There was no family history of cardiovascular or renal disease.

The physical examination was made when the patient was not suffering from an attack. The general condition was excellent. There were no visible signs of cardiac failure. The heart was slightly enlarged to the left and the substernal dulness

was increased in the third interspace. The action was regular save for a slight sinus arhythmia of the respiratory type. The sounds were of good quality. There was a soft midsystolic murmur at the apex and the pulmonic area. The pulmonic second sound was greater than the aortic second sound. The rate was normal. Pressure on the vagi caused slight slowing, the right being more effective than the left. The peripheral vessels were normal except for slight tortuosity of the brachials. There were no abnormal venous pulsations. There was no edema. The blood-pressure was 130 mm. Hg. systolic and 70 mm. Hg. diastolic. The lungs and abdomen were negative. Roentgen-ray screen examination showed some enlargement of the heart to the left, with a straight left border suggesting mitral disease. The aorta was enlarged transversely, but there was no evidence of aneurysm. An electrocardiogram showed prominent P and T waves in Leads I and II, but otherwise was normal.

In view of the history of the attacks with rather characteristic symptoms and a heart rate of about 180 per minute the opinion was expressed that the patient had suffered from paroxysmal tachycardia. During attacks while under observation all means for stimulating the vagi had failed to give any relief. It was, therefore, thought that small doses of quinidin sulphate given regularly would possibly be of value in preventing the onset of serious attacks. Accordingly, the dosage of 0.065 gm. three times daily was advised.

The patient was not seen again until February 7, 1923, when, while in San Francisco, an attack of palpitation began. The history from September 26, 1922 to date was of interest, in that about a week following the use of quinidin as directed dizziness, ringing in the ears, and gastric symptoms were experienced. The drug was stopped for three days and then resumed, with a dosage of 0.044 gm. three times daily. After continuing for three weeks the same symptoms returned and persisted for almost a month. None of the drug had been taken during a period of two months, when the most recent attack began. One attack of palpitation lasting four or five hours was noted during the

use of quinidin and one brief attack occurred since discontinuing the drug.

The most recent attack began early in the morning and had been continuous for five hours when seen at the second examination. The attack was similar to others experienced, with a sensation of fulness in the chest, with pains in the left shoulder and numbness of the arms, more particularly the left. There

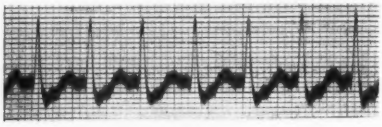

Fig. 182.—Case I, Lead II: Paroxysmal tachycardia, rate 195 per minute.

was moderate cyanosis. No edema was present. The examination of the heart showed slight enlargement. The action was regular, rate being 195 per minute. No murmurs were heard. Vagal pressure, ocular pressure, and change of posture had no effect on the heart rate or rhythm. An electrocardiogram (Fig. 182) showed paroxysmal tachycardia of the auricular type, rate 195 per minute.

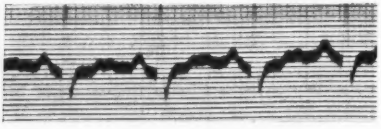

Fig. 183.—Case I, Lead II: After quinin hydrochlorid intravenously. Regular rhythm resumed.

With the history of previous symptoms following the use of quinidin in mind, it was thought best to try the effects of another one of the quinin derivatives. For this purpose we used quinin dihydrochlorid intravenously. The first injection of 0.3 gm. was given from 2.16 to 2.20 P. M. No effects were observed and the patient experienced no untoward symptoms. Electrocardiographic curves were made at frequent intervals and no changes were noted. A second intravenous injection of quinin

dihydrochlorid of 0.3 gm. was given from 2.56 to 2.58 P. M. Within a minute and a half after the needle had been withdrawn the heart rate dropped to 120, and within five minutes to 105 per minute, after which time the rate gradually subsided to 90 per minute (Fig. 183). Following the second injection the patient described ringing in the ears, a feeling of warmth and stimulation. Two hours later there was dizziness and ringing in the ears, followed by a feeling of faintness and vomiting. On the day following the injections there were no symptoms except slight dizziness and some numbness in the left arm. There have been no subsequent attacks as far as I have been able to learn. The patient has been advised to take 0.4 gm. of quinidin sulphate in a single dose under direction for further attacks, or to have quinin dihydrochlorid given intravenously if the attack is accompanied by severe symptoms.

Paroxysmal Auricular Fibrillation Treated with Quinidin Sulphate.—*Case II.*—Mrs. A. B., aged forty-two, entered the Medical Ward of the University of California Hospital (U. C. H. 36,592) February 8, 1922, complaining of palpitation. There had been a cardiac lesion since an attack of rheumatic fever at the age of fifteen years. There had been some dyspnea on moderate exertion since that time, but severe symptoms did not develop until the age of thirty-eight years, four years ago, when there was a sudden attack of palpitation and severe dyspnea. During this attack the patient was treated by the Roentgen ray for a suspected hyperthyroidism and a substernal goiter. There were no more severe attacks of palpitation from 1918 to 1922, but dyspnea and palpitation were complained of on moderate exertion, and it was necessary to use three pillows because of dyspnea in the recumbent position. One week before entry to the hospital a severe attack of palpitation was experienced similar to the one four years before, accompanied by a sharp, constant, non-radiating pain beneath the left breast. During the week before entry the attacks had been frequent, lasting from one to twelve hours.

The past history had been otherwise unimportant except as stated above. The family history was essentially negative.

The physical examination was negative except for the cardiovascular system. There was no evidence of enlarged thyroid or substernal goiter, and there were no signs of hyperthyroidism.

The heart was enlarged to the left, with evidence of increased dulness in the third left interspace. The apex impulse was forceful and a presystolic thrill could be felt. The action was regular except for an occasional extrasystole. The rate was normal. The first sound at the apex was booming, was preceded by a crescendo presystolic murmur, and followed by a blowing systolic murmur transmitted to the left and back. There was a faint early diastolic murmur at the apex. A 2-meter plate of the heart showed enlargement to the left, with a straight left border. The electrocardiogram showed prominent P waves in all leads, but was otherwise normal. The blood-pressure was

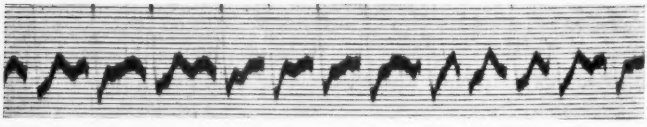

Fig. 184.—Case II, Lead II, February, 1922: Auricular fibrillation, rate 180 per minute.

105 mm. Hg. systolic and 75 mm. Hg. diastolic. The pulse was of small volume. The arteries and veins were within normal limits. There were no signs of passive congestion.

The laboratory findings showed normal blood and urine. The blood Wassermann reaction was negative.

A diagnosis of mitral stenosis and insufficiency on a rheumatic basis was made. Attacks of paroxysmal tachycardia were suspected.

During an observation of nine days in the hospital two attacks of palpitation were observed, with a ventricular rate of 180 per minute. An electrocardiogram (Fig. 184) was obtained of one of the attacks, which lasted three hours. The rhythm was very irregular and the curves showed auricular fibrillation. The second attack was of very brief duration.

The patient was put on treatment with quinidin sulphate

0.2 gm. t. i. d., which was continued after discharge from the hospital.

For the following three months, while on quinidin therapy, two brief attacks of palpitation were experienced. From May, 1922 until February 18, 1923 no attacks were complained of, and the quinidin had been used as directed without toxic symptoms. On February 16, 1923 the last dose of quinidin had been

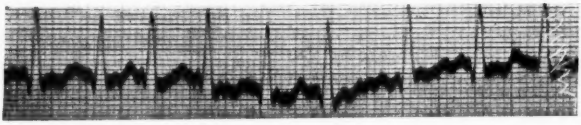

Fig. 185.—Case II, Lead II, February 19, 1923: Auricular fibrillation, rate 170 per minute. Before quinin and quinidin were administered.

taken. About twenty-four hours later an attack of palpitation began, which had continued for twenty-six hours when the patient returned to the hospital for observation.

On examination the heart was very irregular, ventricular rate 170 per minute, marked pulse deficit, moderate cyanosis. There were no signs of decompensation. An electrocardiogram (Fig. 185) showed auricular fibrillation.

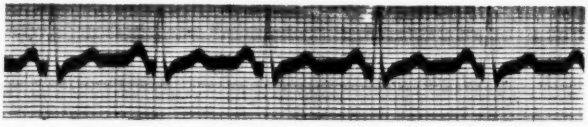

Fig. 186.—Case II, Lead II: Taken after intravenous quinin hydrochlorid and quinidin sulphate by mouth. Regular rhythm rate 90.

Treatment.—An intravenous injection of 0.3 gm. of quinin dihydrochlorid was given at 10.55 A. M. Immediately after the injection the patient felt faint. No change was noted in the cardiac condition. Frequent electrocardiograms taken until 12.20 P. M. showed no change in the cardiac rate or rhythm. At this time, no quinin dihydrochlorid being available, 0.4 gm. of quinidin sulphate was given by mouth. At 12.30 P. M. the

heart had resumed the normal rhythm. The rate had quickly dropped from 170 to 120 per minute. The electrocardiogram (Fig. 186) showed prominent P waves and flattened T waves in all leads. The P waves were notched in Lead I. One hour after the normal rate was resumed the patient felt faint, had ringing in the ears, and had two watery bowel movements. Thereafter there were no symptoms. The small doses of quinidin, 0.2 gram t. i. d., have been resumed and there have been no subsequent attacks.

Extrasystoles Treated by Quinidin Sulphate.—Several cases have been under observation for the past year with frequent extrasystoles, which have been of great annoyance to the patients. We have tried small doses of quinidin (0.1–0.2 gm.) given regularly, with great relief of symptoms in some cases. Whenever possible we have sought for the cause of the irregularity and have only used the drug as a temporary measure. No toxic effects have been observed in these cases.

Summary and Conclusions.—In the 2 cases reported it was shown that members of the quinin group were of value in preventing and stopping attacks of paroxysmal auricular tachycardia and paroxysmal auricular fibrillation. Extrasystoles may be similarly controlled as a temporary measure if the irregularity causes great discomfort to the patient.

BIBLIOGRAPHY

Clerc and Pezzi: Quinine in Heart Disease, Medicine, Paris, March, 1921, p. 443. *Abstract*, Jour. Amer. Med. Assoc., April 21, 1921, p. 1212.

Hewlett, A. W.: Paroxysmal Tachycardia, Case where Quinidin Lessened the Frequency of Attacks, Medical Clinics of North America, vol. 6, No. 2, p. 205, September, 1922.

Kerr, William J., and Bender, William L.: Paroxysmal Ventricular Fibrillation with Cardiac Recovery in a Case of Auricular Fibrillation and Complete Heart-block while Under Quinidin Sulphate Therapy, Heart, vol. ix, No. 4, December, 1922.

Levy, R. L.: The Clinical Toxicology of Quinidin, Jour. Amer. Med. Assoc., 1922, lxxviii, 1919–20.

Lewis, T., Drury, A. N., Iliescu, C. C., and Wedd, A. M.: Observations Relating to the Action of Quinidin Upon the Dog's Heart; with Special Reference to its Action on Clinical Fibrillation of the Auricles, Heart, 1921–22, ix, 55–86.

Lewis, T., Drury, A. N., Wedd, A. M., and Iliescu, C. C.: Observations Upon the Action of Certain Drugs Upon Fibrillation of the Auricles, Heart, 1921–22, ix, 207–268.

Pascale, C.: Cerebral Embolism with Congenital Mitral Stenosis, Recovery Under Quinin and Iodid, Gazzetta Ospedali e della Cliniche Milano, November 4, 1915.

Schrumpf, P.: Quinin in Auricular Fibrillation and Tachycardia, Presse Medicale, July 31, 1920. *Abstract*, Jour. Amer. Med. Assoc., p. 842, September, 1920.

Wenckebach, K. F.: First Mention of Quinin in Auricular Fibrillation, Sie unregelmassige Herztatigheit, 1914.

Diko, L. E., Marvin, H. M., White, Paul D.: Clinical Report on the Use of Quinidin Sulphate, Archives of Int. Med., vol. 31, No. 3, p. 345, March 15, 1923.

CLINIC OF DR. WILLIAM P. LUCAS

UNIVERSITY OF CALIFORNIA HOSPITAL, DEPARTMENT OF PEDIATRICS

DIAGNOSIS AND TREATMENT OF PYLORIC STENOSIS

I WISH to present today a case of pyloric stenosis and discuss this condition from the standpoint of diagnosis and treatment.

Case History.—Baby L. was born in this hospital on March 18th. He was a full-term baby, normal delivery, birth weight 3060 grams (6 pounds, 7 ounces). The only interesting point in the family history is the fact that the mother says all her children have vomited during the first few weeks. She has had 3 other children. One child who was also born in this hospital gives a history of having vomited during the first few weeks, but on the regulation of breast feeding the vomiting stopped. There was no history of any projectile vomiting in the other 2 children.

Baby L. commenced vomiting on March 19th, the day after birth. On this day he vomited small amounts after each feeding, more of a type of regurgitation, and not considered serious. Between March 20th and 24th the vomiting increased, and his weight fell to 2950 grams. There was no projectile vomiting and the general condition of the baby was good. For this reason it was not thought necessary to give him extra fluids. On the 24th and 25th of March, the sixth and seventh days after birth, there was no vomiting and he gained 50 grams. The following day, however, vomiting became much more severe. He gradually vomited everything he took, and before the end of the day he was given a hypodermoclysis of 50 c.c. of salt solution and 50 c.c. of a 10 per cent. glucose solution into the longitudinal sinus.

His stomach was washed out, but he continued vomiting. The next three days he vomited practically everything. During

this time his feedings consisted of breast milk thickened with cereal (16 per cent. rice flour cooked and added to pumped breast milk). The general water needs of the infant were kept up with intraperitoneal or subcutaneous injections of salt solution, and glucose was given intravenously through the longitudinal sinus. On the morning of the 29th the first signs of projectile vomiting and reverse peristalsis were noted. He was taken to the *x*-ray room and given a small amount of bismuth in his milk. The bismuth was observed in the stomach over a period of four hours, during which time none passed the pylorus. The stomach was then washed out, and he was put on atropin and the thick cereal feedings were continued, but

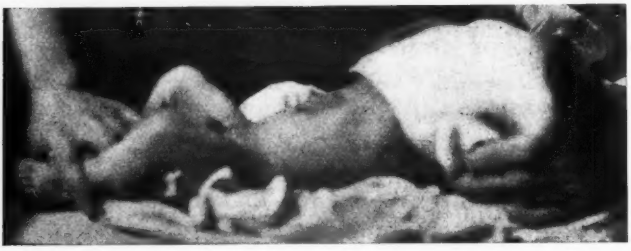

Fig. 187.—Picture of baby L. taken just before operation, showing gastric wave. The stomach outline can be distinctly seen just above and to the left side of the umbilicus.

throughout the night and on the day of the 30th he was still vomiting everything taken. The vomiting was generally projectile in type. The peristaltic wave was very much more marked than on the previous day. The *x*-ray still showed a small amount of bismuth in the stomach and none in the intestines. Operation was considered imperative, and after giving him an intravenous injection of 50 c.c. 10 per cent. glucose through the longitudinal sinus, a Fredet-Rammstedt operation was performed (Fig. 187).

At the operation the pyloric ring was found to be thickened and cartilaginous. It had a whitish-gray, glistening appearance and was approximately $\frac{1}{2}$ inch long and about $\frac{1}{8}$ to $\frac{1}{4}$ inch thick.

The operation was completed in about thirty minutes. Before the sutures were closed 100 c.c. of Ringer's solution were introduced into the peritoneal cavity, and he was sewed up. He received no fluid by mouth for four hours, and then was given a small amount of sterile water, which he vomited. His temperature rose that evening to 38° C. and small quantities of water or 5 per cent. lactose solution were all vomited. He was given, therefore, another intravenous injection through the longitudinal sinus of 50 c.c. 10 per cent. glucose solution and also 50 c.c. of normal salt solution by hypodermoclysis.

On the 31st, the day after the operation, his temperature remained up, reaching the highest point of 40.9° C. Throughout this day he vomited everything given by mouth. He was given a rest period of eight hours and all his fluids were injected either intravenously or subcutaneously. His stomach was washed out with soda bicarbonate solution, but he still continued to vomit. On April 1st he was given Murphy drip by stomach, the small catheter being introduced into the stomach and regular Murphy drip administered. In this way between 50 and 60 c.c. of fluid was given, and he vomited only a very small amount. His temperature remained high throughout that day and the following morning was 38.4° C., but before afternoon returned to normal. He regurgitated very little and was given diluted breast milk in small quantities. That day he took between 60 and 80 c.c. of breast milk, with practically no vomiting. There was no more vomiting, and on April 4th he was put to the breast, taking as much as 60 to 80 c.c. at a nursing. His weight on April 3d, undressed, was 2830 grams. Just previous to operation his weight had been down to 2650 grams, which shows a regain of 180 grams between the time of operation and the fifth day after. From that time his progress was perfectly normal.

Several months ago we had a similar case except that the child was a firstborn girl baby. Her birth weight was 2665 grams. She also commenced vomiting after the first feeding on the first day and continued to vomit practically everything throughout the first week.

On the sixth day vomiting became projectile and peristaltic waves were visible. *x*-Ray, however, showed that some food was going through the pylorus. She was put on atropin and

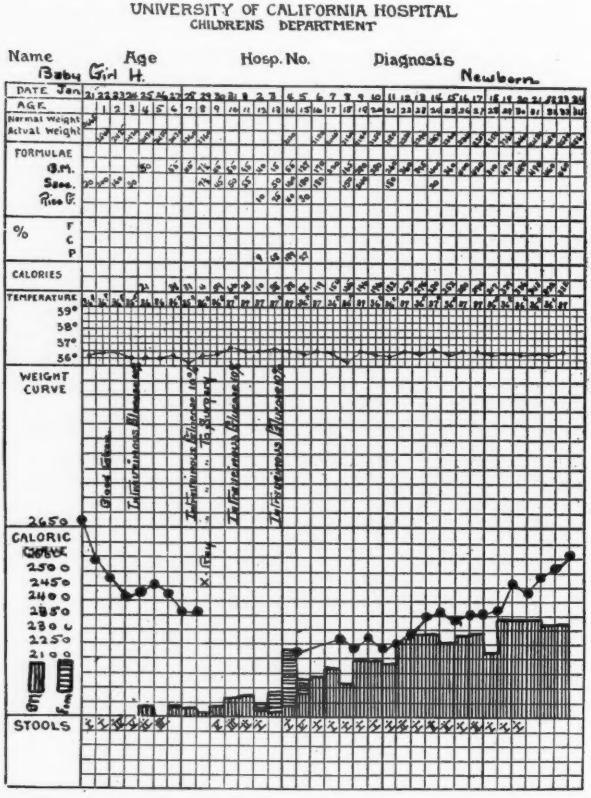

Fig. 188.—Chart of baby girl H., showing loss in weight before operation and regain of weight as breast milk feedings were increased. Also indicates times intravenous 10 per cent. glucose was administered.

her water needs kept up by intravenous or subcutaneous methods. Fredet-Rammstedt operation was done on the eighth day, and practically the same condition was found as in the first case reported—a small cartilaginous pyloric ring. She made a

complete recovery after the operation and, as shown by the chart, had almost regained her birth weight when discharged at the end of her fifth week. (See chart of baby girl H.)

Discussion.—The first account we have of pyloric obstruction was published by George Armstrong in 1777. It appears to be a description of a case of pyloric spasm rather than pyloric stenosis. The next reference is a case reported by Hezekiah Beardsley in 1788. This case presented the typical symptoms

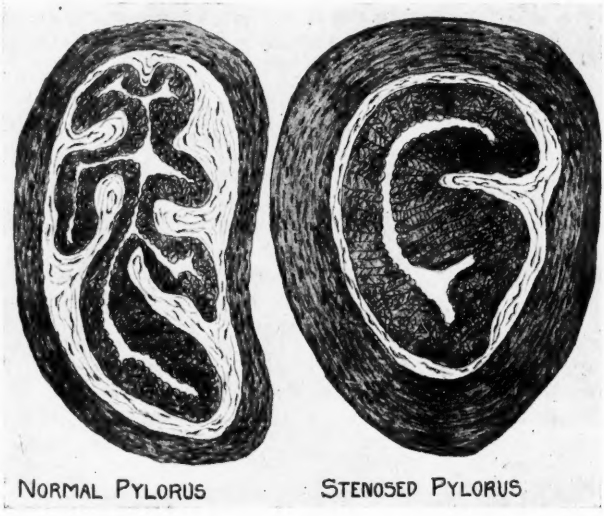

Fig. 189.—Cross-sections of a normal pyloric ring and a stenosed pylorus. Both the circular muscle-fibers and the mucosa are thickened.

of obstruction during the first week of life, and then came to autopsy at the age of five years, at which time a "scirrhosity" of the pylorus was noted. Beardsley's account did not give the clear clinical picture of the condition which was supplied by Hirschsprung in 1887, who at that time reported 5 cases to the German Pediatric Society. Nine years later, in 1896, John Thomson, of Edinburgh, reported a case of pyloric stenosis. Since then numerous reports have appeared in the pediatric

literature of all countries, but little progress in the treatment and management of these cases was noted until about 1900, when the medical and surgical treatment as well as early diagnosis attracted the attention of pediatricians throughout the world. The literature is replete with many case reports and analyses of results of operative and medical treatment.

Obstruction of the pylorus in infancy has been ascribed to a number of causes.

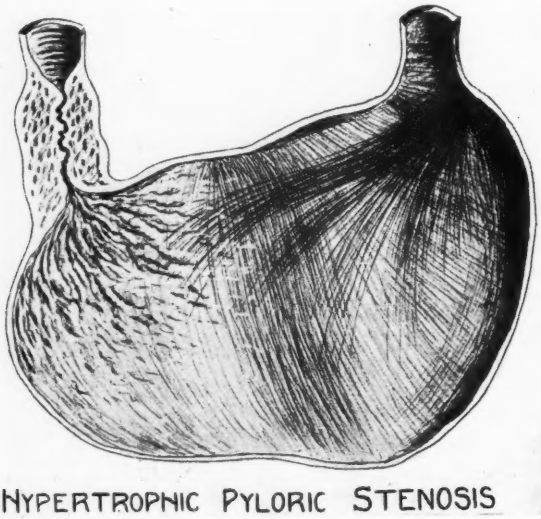

Fig. 190.—Longitudinal section of the stomach showing the thickened pyloric musculature and the corrugated appearance of the pyloric mucosa.

The two most prevalent theories attribute it to a spasm of the sphincter which produces a muscular hypertrophy of the circular fibers of the pyloric ring, and the second, to a congenital hypertrophy of the musculature of the sphincter (Figs. 189, 190). Undoubtedly both types occur, but the 2 cases presented today are, without question, illustrations of congenital pyloric stenosis.

The incidence of pyloric stenosis has been variously estimated from a fraction of 1 per cent. up to 4 per cent. of all births.

Hospital reports of incidence are often misleading because most cases are referred to hospitals, and pediatricians thus give a wrong impression of the prevalence of the condition. Pyloric stenosis is more common among male children than among females. About 80 per cent. of the reported cases have been in males, and there is no satisfactory explanation for this. The only one offered which may have some value is that of Grey and Pirie, who state that males are generally more vagotonic and females more sympathotonic, and that overaction of a vagotonic mechanism may cause a stenosis. This explanation is probably more hypothetic than real, and so far we have no true explanation of the increased incidence in males. The age incidence of reported cases varies considerably, but pyloric stenosis seems to be more common in the third or fourth week of life. Dent has reported finding the condition in a seven months' fetus, and there are many reports of such cases as ours in which the vomiting began on the first day of life and continued until the time of operation. Mitchell also reports a case of hypertrophic pylorus in an infant at term, still-born. There are several reports of cases occurring much later in life. Holt reports a child who showed symptoms at the age of four and a half years, and Graham one at six and a half years, but these are exceptions, as the majority of cases occur before the sixth week.

Etiology.—The simple explanation for the condition in infants is a developmental defect of the sphincter muscle. There is also an increase in the circular muscle tissue at the pyloric ring which partially or completely occludes it. What is difficult to explain is the appearance of pyloric stenosis after several days or weeks of life, during which time there can have been no obstruction or sign of abnormality, since gains have been regular and normally digested milk stools have been passed. It was for this reason that the theory of pyloric spasm was advanced, which argues that the pylorus for some reason becomes irritable, and through a spasmodic contraction a hypertrophy is developed. This explanation seems to me to fail to account for the very definite tumor of a cartilaginous nature so often present at

operation, and the fact that spasms in other hollow viscera are not followed by such muscular hypertrophy. A combination of these two theories, however, would in many cases explain the picture. From this point of view the child at birth has a pylorus with a relatively thickened and cartilaginous musculature and a redundant mucosa. Following the constant irritation of food passing through such a canal the mucosa becomes edematous and inflamed, and finally a spasm of the muscle is produced. Owing to the differing degrees to which these two factors—congenital malformation and "irritative spasm"—may be involved, different clinical pictures will be produced. On the one hand, a predominance of the congenital factors produces a condidion which shows itself very early, while those in which the irritative factor predominates will appear very much later.

Symptoms.—The onset of symptoms of pyloric stenosis in some patients is gradual. In others the symptoms are so abrupt that the child's mother can give an accurate date, often the exact hour, which marks the onset. The essential symptom is vomiting, which usually first occurs immediately after feeding, and it makes little difference what the feeding is, whether breast milk or plain water. In a short time a very definite group of characteristic symptoms appear, and the vomiting soon becomes projectile in type. In a certain number of cases the vomiting is projectile and violent from the beginning. It is this projectile type of vomiting which makes the condition easy of recognition, as it is very characteristic and is simulated by few other conditions, especially at this early age. The onset of vomiting generally occurs immediately after feeding or during the feeding, and may be so constant an accompaniment that the child literally starves to death. In these cases it is noted that the child takes the food with great eagerness, indicating his willingness to eat, and thus differentiating the condition from other gastric disturbances. The vomitus may be clear or it may be bile-stained, depending on whether the obstruction is complete or partial.

The second characteristic symptom is gastric peristalsis. If the baby is carefully observed the gastric wave can be followed from the left hypochondriac region across to the right, dis-

appearing under the right costal border, to return in the reverse direction. These waves may be quite frequent or may appear at rather long intervals, depending somewhat on the gastric tone and the duration of the condition. If the condition has existed any length of time, gastric retention follows. The vomiting in such cases does not appear immediately after feeding, but occurs intermittently, sometimes not until after the second feeding or hours after the first feeding, when large quantities are vomited. In these cases also the vomitus has the appearance of food which has been long delayed in the stomach, and is often acid or fermented. Both the question of obstruction and the size of the stomach can be easily made out by an *x*-ray bismuth meal, though diagnosis may be made without this.

The amount of retention can also be measured by drawing off the stomach contents through a catheter. Often amounts much larger than those given are obtained, which means, of course, that the food plus the gastric secretions have all remained in the stomach. Such stomach washings often give a great deal of relief to the patient as well as information to the pediatrician.

With the continued vomiting is a loss in weight which at first may be less marked than persistent. As the weight decreases the peristaltic waves usually recur more frequently, and the retention of food increases with the loss of tone of the stomach. The loss in weight then becomes a prominent symptom. Unless the water needs of the child are maintained by artificial means the child is likely to go into an acute collapse, become dehydrated, and in great danger of acute intoxication.

Another point of considerable value is the appearance of the stools. At first the stool may contain a small amount of milk, but later stools become meconium-like and consist mainly of bile, mucus, and intestinal detritus. Finally, a certain degree of constipation is present, and the child may have periods of whole days without passing any feces or very small stools which just barely stain the diaper.

Diagnosis.—With these prominent symptoms the diagnosis s comparatively easy. No other disease in early infancy gives

the same combination of symptoms, though when the early symptoms are not marked there may be some difficulty in making a differential diagnosis between simple spasms and true hypertrophic stenosis. There are a great many irritative conditions which may occur in the newborn or infant of a few weeks which will cause a certain amount of vomiting, such as overfeeding, irregular feeding, and especially the ingestion of air with the food. None of these, however, will cause typical projectile vomiting, and the loss of weight and characteristics of starvation and meconium stools are usually absent in these patients. While the *x*-ray evidence is unnecessary for diagnosis, it will often assist in making the diagnosis positive, as was shown in our first case, where it could be definitely ascertained that no food was passing the pylorus. This tends to shorten the period of observation, which, to my mind, is a very important factor in the ultimate outcome. Hess has been able to demonstrate the degree of stenosis by the use of the duodenal catheter; the size of the catheter admitted into the duodenum indicating the degree of hypertrophy, and the hyperactivity of the reflexes elicited, on passing into the duodenum, indicating the degree of the spasm.

Indication for Medical or Surgical Treatment.—I feel in early cases it is perfectly justifiable to try modern methods of infant feeding, particularly the application of thick cereal feedings. If these feedings are closely observed and the weight and stools of the child carefully watched, a fairly definite estimate of their value can be made within a very few days, especially if the feedings are accompanied by the administration of atropin. Most cases of true spasm of the pylorus will be corrected by atropin treatment in conjunction with thick cereal feedings. Our plan of treatment has been to give 1/400 gr. of atropin half an hour to twenty minutes before feeding, following this by washing out the stomach with a weak soda bicarbonate solution and then feeding from 2 to 3 ounces of a 16 per cent. fine rice cereal which has been cooked in a double boiler an hour and a half to two hours. This should be of sufficient thickness to form a jelly on standing, but when warmed and mixed with an

equal quantity of breast milk will just pass through a "hygea" or a breast type of nipple with ¼-inch slit in the nipple. The infant is placed in the usual position and the nurse with her left hand holds the large nipple over the infant's mouth. The cereal is slowly poured into the nipple and with a spoon the nurse gently presses it through the slit as the child sucks. It is better to divide the feeding into two portions, with half of it standing in hot water to keep it fluid, and changing the nipples just as soon as the feeding begins to thicken and shows difficulty in passing through the nipple. It takes much patience and persistence to feed such a baby, the process usually requiring one-half to three-quarters of an hour. For this reason we do not believe in feeding too frequently, certainly three hours and, better, four hours should elapse between feedings. Following the feedings the child should be handled as little as possible. In a certain number of cases the application of moist heat by cloths wrung out of hot water to the abdomen will occasionally reduce the tendency to spasm. If the first feeding is vomited we wash out the stomach, wait for half an hour, and refeed. Such a procedure practically means constant care. The mother must give her entire time to the feeding or the services of a nurse are required. Where the condition occurs in the first week of life my own feeling is that a very short time should be given to trying out any form of feeding and that operation should be resorted to early. Certainly no weight loss greater than 500 grams or approximately a pound should be allowed. Where the symptoms do not appear until the child is three or four weeks of age the weight should not be allowed to fall below the birth weight before operation is undertaken. During the whole period when feedings are being tried strict attention must be given to the water needs of the child, and on the calculation of how much the child has retained of the food depends the amount of salt solution or glucose that must be administered. If the water needs are kept up from the date of the first vomiting the trial of the thick feedings can be carried over a longer period, as there is less danger of the child becoming dehydrated or going into a sudden collapse. If after several days of careful watching

the weight continues to fall or if the stools remain of a starvation type, I believe that operation is distinctly indicated. Since the Fredet-Rammstedt type of operation has been developed, which simply cuts through the muscle layer down to the mucosa separating the thickened cartilaginous muscle, the risk from operation has been greatly reduced. The old operation, which was a gastro-enterostomy, gave a mortality of about 40 per cent. This mortality is partially accounted for by the fact that there was a greater delay in operating, which naturally increased the risk tremendously. The average mortality of the Fredet-Rammstedt operation is between 18 and 20 per cent., taking into account all cases both early and late. In our experience the mortality has been practically nil where the operation was performed within a week of the first projectile vomiting. The only death we have had in early operative cases was due to a persistence of projectile vomiting after the operation. At autopsy a definite valve was found at the pyloric opening which completely shut off the duodenum. This appeared to be merely thickened mucosa, but was, in reality, a congenital mucous tissue valve which stood out from the rest of the lumen, in appearance very like the submucous valves in the rectum or the type of mucous tissue valves occasionally found in the bladder. If this diagnosis could have been made before operation the child might have been saved, and it probably could have been made if we had taken a bismuth meal *x*-ray following the operation. A posterior gastro-enterostomy might have saved the case, but such anomalies are undoubtedly very rare.

The advantages of early operation are marked reduction of risk from starvation, practically little or no postoperative shock, and little or no danger of sudden death. With the Fredet-Rammstedt operation the time consumed in operating has been materially shortened, so that postoperative collapse rarely occurs. Our experience has shown that within a few days after the operation the child will resume his normal nutrition and begin to gain. In fact, infants are not allowed to become malnourished. This also favors healing of the wound (often delayed in very malnourished children), and the chances of a

secondary peritonitis are thereby reduced. Postoperative feeding problems in cases which have not developed malnutrition are easily solved. Where operation has been delayed and the child is markedly malnourished the feeding problem becomes a very difficult one even after the obstruction has been removed. Early operation on a child in good condition shortens the period of after-care to a few days or a week, and the physician does not have a chronic nutritional condition to deal with. By early operation the mortality should certainly be reduced to less than 10 per cent. and should even be a negligible factor.

The first cause of death in most instances is collapse from the operation. This usually occurs when the operation has been delayed or is prolonged, and when insufficient attention has been given to keeping up the heat of the child and too great exposure allowed.

There are few conditions in which the immediate outcome for the child depends so directly upon the skill and rapidity of the surgeon as does that of pyloric stenosis.

The second main cause of death is malnutrition, which is a positive indication of too long delayed surgical intervention. General peritonitis is next in importance as a cause of death, as I have already stated; this is more likely to occur in malnourished children where their resistance to infection is low. Such a surgical complication as bronchopneumonia is very much more likely to occur in atrophic babies than in fairly well-nourished infants. Occasionally a child will die postoperatively from hemorrhage, but if care is taken at the time of operation to see that all bleeding has ceased before the abdomen is closed there should be little danger of this casualty. A physician lacking experience of the results of early operation is often surprised to see how well these infants stand the shock of operation. Usually for the first half-hour following the operation the color is poor, the pulse may be weak, and respiration shallow, but if the child is kept in a semirecumbent position and the external heat maintained, these symptoms usually disappear very rapidly.

The most important point in after-care of the child is main-

tenance of body heat. This has already been emphasized as of great importance during the operation, and should be as carefully watched following the operation. Second in importance is the position of the child. Some surgeons feel that for the first half-hour the head of the bed should be lower than the foot to facilitate the saliva running out of the mouth and upper respiratory passage. This, however, is usually unnecessary if the anesthetic has been carefully given and care has been taken to wash out the stomach just previous to operation.

If the peritoneum is filled with Ringer's solution at the time of operation or an intravenous injection of glucose is given, the vomiting following operation can be practically eliminated.

Our plan has been to keep the child in a semi-erect position. This facilitates the emptying of the stomach and tends to prevent regurgitation. Hypodermoclysis or intravenous injection is indicated as a routine measure. It prevents dehydration, as already mentioned, and obviates the necessity of giving the child fluids by mouth immediately following the operation. We usually commence feeding within three or four hours following the operation. Breast milk well diluted or plain water, usually beginning with 1 or 2 teaspoonfuls, may be given by a medicine-dropper. The amount is gradually increased, so that by the end of forty-eight hours the child is getting from 1 to 2 ounces every three hours. If vomiting occurs following operation a longer interval of rest should be allowed and the stomach washed out. Sometimes we have found that an ounce of fluid left in the stomach after the washing will be retained. In the case reported, where regurgitation continued for more than forty-eight hours, the Murphy drip by stomach-tube gave very good results. This is very easily carried out, as these children are not restless and the stomach-tube can be held in position with a little adhesive strap at the corner of the mouth. The rate at which the gastric Murphy drip is given should be carefully watched. It should be no faster than 1 ounce to half an hour. If vomiting does recur it is safe to put the child to the breast after three or four days. The infant should be allowed to nurse for only two to three minutes at first. Many feeding tests have

shown that from 1 to 2 ounces are taken during the first five minutes of nursing.

From this point on the child usually progresses very rapidly and returns to birth weight within a period of two or three weeks following the operation. Regain of weight, as has been stated, depends on the amount of loss before and immediately following the operation.

It is interesting to speculate concerning the hypertrophied pylorus. We have some information regarding this point. Downes, Holt, and Morse have reported cases which died from six months to two years after gastro-enterostomy in which the circular muscle was still thickened and apparently there had been no change. Quite in contrast to this are the findings following the Fredet-Rammstedt operation. Wollstein examined a series of postoperative cases ranging from twenty-four hours to two years after this type of operation. Within nine days the pylorus feels softer than at the time of operation. Twenty-five days after operation the pylorus has returned to practically its normal thickness. The normal pylorus is about 2 mm. thick, while the circular muscle thickness of the hypertrophied pylorus is from 3 to 7 mm. After sixteen months Wollstein states that there was only "a very fine linear scar and after two years the scar was hardly visible." This bears out the clinical findings of recovered cases. They have no further symptoms of pyloric obstruction and from a nutritional standpoint show no signs of any defect. Their progress is usually that of any normal infant if their feedings are properly regulated.

CLINIC OF
DR. LANGLEY PORTER
DR. C. F. GELSTON

UNIVERSITY OF CALIFORNIA HOSPITAL

A DISCUSSION OF THICK FEEDING IN INFANCY

FOR some time past, thanks chiefly to the work of Sauer, of Chicago, the thick feeding has held an important place in the dietetic therapeutics of infancy.

The indications for the use of this food and the method of its preparation are to be the considerations of our discussion today. Case histories illustrating success and failures are here before us.

Persistent vomiting, especially if it is cumulative and projectile, must lead one to consider concentrated cereal milk mixtures for the patient's diet. It was McClure who first proposed this type of food for vomiters of the so-called anorexio-nervosa type, and from him Sauer took the hint utilizing the food as a therapeutic measure for other forms of vomiting, especially for pylorospasm and pyloric stenosis.

Sauer's trial was eminently successful, so that today we have a definitely valuable medical measure for the relief of pyloric stenosis, where, heretofore, we have had to depend entirely upon surgical intervention. The feeding of cereal thickened formulæ, however, has a much wider field of usefulness than it finds in the treatment of pyloric stenosis. As an adjunct to the atropin treatment of pylorospasm it is of equal, if not of greater use. For valuable as it is for the feeding of patients with hypertrophy and obstruction at the pylorus, and curative, as it sometimes is, we still must depend upon the Fredet-Rammstedt muscle-splitting operation to relieve patients whose vomiting

is refractory or whose malnutrition from prolonged starvation has become alarming. Nevertheless, there will still be instances in plenty where proper therapeutic use of the thick food will save patients the risk of operation.

The type of vomiting that occurs in neurotic babies who have reached the last quarter of the first year is another condition improvable by the aid of this dietetic measure. Those who have seen many babies fed on concentrated cereal milk formulæ must all have been struck, as Mixsell has been, with their sturdiness and vigor. Rapid gain in weight, a maximum development of turgor and muscular strength seem to result after almost every extended trial of food.

Further, as a food for the postoperative case of pyloric stenosis which still shows vomiting, it has no equal.

The occurrence of vomiting of varying degree in early infancy is only too common. It is true that a great many such cases respond promptly to measures directed toward remedying errors in the mechanics of nursing, either at the breast or from the bottle, or in the preparation of artificial food. The vomiting of breast-fed babies in the first few weeks of life has usually a mechanical cause, for instance, a too rapid flow of milk, too frequent nursing, too copious supply, or, on the other hand, a scant supply requiring a great deal of suckling on the part of the infant, with a resultant intake of a large amount of air, and a little later eructations of air and with it the food. The vomiting of bottle-fed babies, similarly, may have as a cause, for example, a too rich mixture, too rapid intake, too frequent administration of food, too much handling or, again, the presence of a large amount of swallowed air from any one or more of the above errors in feeding.

Such cases do not need thick feeding, naturally; they respond to regulation of matters at fault, but there are other and more important causes of vomiting. To determine these causes the history is of importance—a great deal of importance in fact. The complaint is usually simply of vomiting, a resultant loss of weight, to be sure, but mainly that the baby retains little or nothing in its stomach. Vomiting from the above-mentioned

cause is much more apt to have the characteristics of regurgitation, and only occasionally of true vomiting; second, it is not so frequently a constant occurrence, and third, as a rule, it does not have the features of being of such large quantity or with the element of retention which is seen in a case of obstruction at the outlet of the stomach.

In a case complaining of vomiting the age is also of importance. Early cases of pyloric obstruction, even during the first few days, are certainly not unusual, but the typical period of onset is later—from four to six weeks. Further, the character of the vomiting—projectile—with evidence of retention; the appearance of the stools with steadily diminishing evidence of food elements; the loss of weight and turgor, an early pallor apparently largely due to a comparatively rapid dehydration, and the presence of a peristaltic wave make up a fairly definite future. The palpation of a tumor is not necessary in forming a decision as to the treatment of such a case.

To proceed to the treatment, for the differential diagnosis between pyloric stenosis and spasm is not the object of this clinic, it will depend entirely on the condition of the child when it is first seen. As frequently happens, when, at the age of five or six weeks, a baby begins to show the foregoing symptoms and signs, while under observation, there is seldom reason for omitting the use of a thick formula. Depending, then, on this reaction in regard to weight and to vomiting, operation is performed or not. A case seen later, after the usual two or three weeks of steady loss, while many formulæ are experimented with, will usually present a picture of such urgency that, although medical treatment by thick feeding might possibly suffice, nevertheless, because the Fredet operation has proved so completely curative, a conscientious physician must resort to it in order not to lessen the infant's chance for prompt recovery.

A demonstration of the first case is the one whose chart is shown (Fig. 191). This child had been observed since birth. Complementary feeding was necessary and the child thrived fairly well until the age of three weeks, at which time he began to vomit in increasing amounts, with the presence of peristaltic

6993

waves. By the use of a thick mixture, at first of skimmed milk, then increasing to whole milk in the proportion of milk 21 ounces, water 29 ounces, rice-flour 15 tablespoonfuls, sugar of milk 4½ tablespoonfuls, seven feedings of 5 ounces each, vomiting ceased and progress was steady.

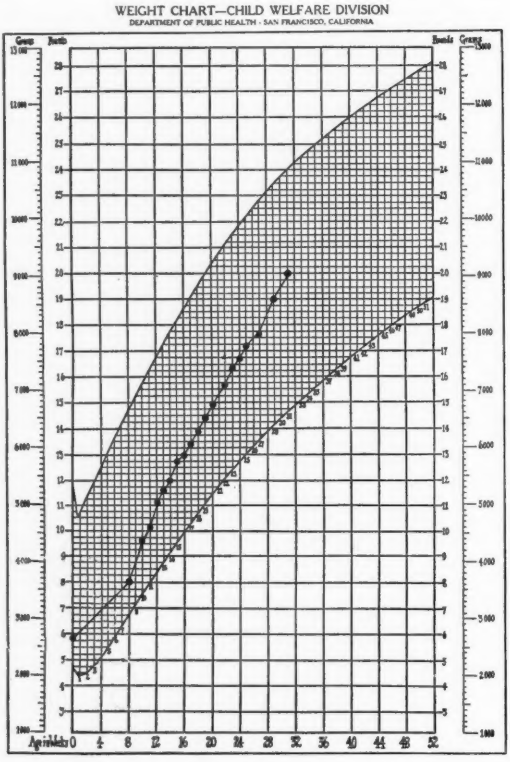

Fig. 191.—Chart I.

The second case demonstrates a condition which did not respond to the use of thick food, although a thorough trial was made, but possibly at too late a date when too much weight had been lost. This particular infant was first seen at the age of

three months, weighing 9 pounds, whereas his birth weight had been 10½ pounds. The vomiting was constant (it also had had its onset at five weeks) and markedly projectile. The stools were starvation type. The dehydration was extreme, nevertheless, for a period of twelve days, thick food was attempted. Fat

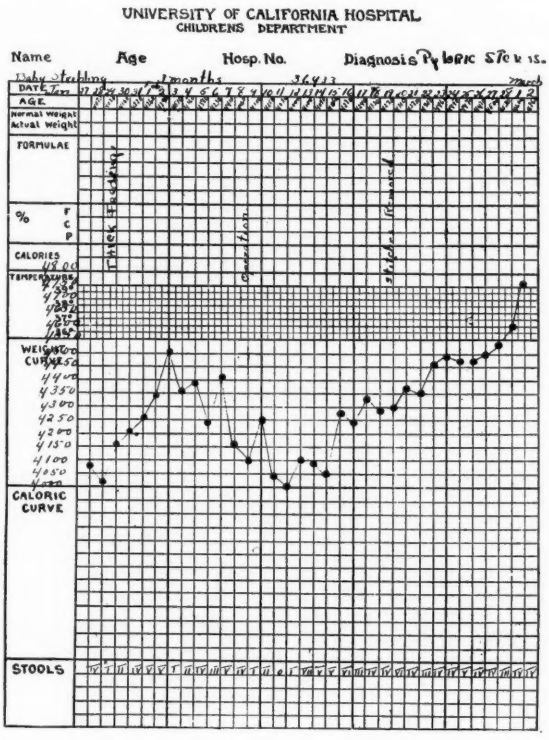

Fig. 192.—Chart II. Course in hospital.

free milk 10 ounces, water 20 ounces, cream of wheat 3½ ounces, Dextrimaltose 1 ounce. Six feedings of 5 ounces each. The child vomited much less, but gained only a total of 3 ounces in that period. Vomiting did not entirely cease for another ten days as occasionally occurs in a long delayed case, but the

weight began after six days to steadily increase. The great value and real necessity for the administration of fluids here may be dwelt upon in a patient showing dehydration, either as a preparation for operation or as an aid to medical treatment.

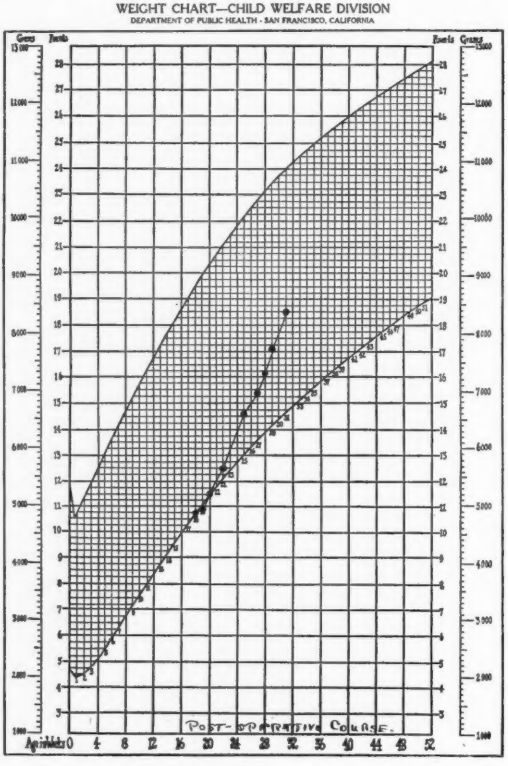

Fig. 193.—Chart III.

The method of administration is, from choice, the intraperitoneal route, since this combines the factors of ease, speed, rapid absorption, and very prompt response.

A further case shows the development of such rapid projectile vomiting, marked peristaltic wave, a standstill in weight,

dehydration, on thick feeding with the history dating from two weeks, that operation was required by the fourth week, with an uneventful recovery. The baby had been born at term, weighing 6 pounds, 2 ounces. He had been breast fed, complemented with Nestle's Food, but there had always been a certain amount of regurgitation. Because of this thick feeding had been instituted. The results, however, were as stated above.

On the other hand, the next chart shows the results in a case weighing 7 pounds, 15 ounces, whereas the birth weight had been 9 pounds, 2 ounces. He had always vomited, and because this began during breast feeding, that was discontinued for a trial of many mixtures. Projectile vomiting occurred for the first time the day before consultation. He was much emaciated, with very poor turgor, and with a markedly erectile stomach. Nevertheless, he was placed on a formula of milk 10 ounces, water 18 ounces, cream of wheat 6 tablespoonfuls, lactose 3 tablespoonfuls, six feedings of 4 ounces each. This he retained entirely after the fourth day, at which time 4 ounces of cream were removed from the top of the milk before making the formula. This incidentally well demonstrated the point that it is practically always wiser to begin a thick mixture with the use of skimmed milk rather than whole milk, gradually increasing the fat instead. The high percentage of carbohydrate in the form of starch seems to definitely contraindicate an early high fat content as shown by a persistence of vomiting or at least a great deal of discomfort (Fig. 194).

Another case of successful treatment is seen in an infant first coming under observation at the age of nine weeks, weighing 8 pounds, 2 ounces, which had been her birth weight. The history was of breast milk for two weeks, then a series of formulæ ranging from sweet condensed milk (Eagle Brand), Imperial Granum, cow's milk with water, with cereal, with all the forms of sugar, a typical history of the vain attempt so usually encountered in trying to overcome the main symptom of vomiting and its resulting one of loss of weight. Her physical examination showed the usual findings of emaciation, dehydration, sunken fontanels, pallor, loss of turgor, peristaltic wave. She was

placed on a formula of milk 14 ounces, water 12 ounces, cream of wheat 6 tablespoonfuls, sugar 2 tablespoonfuls. The result is shown (Fig. 195).

There is the rather infrequent occurrence of persistence of vomiting after the Dredet operation for pyloric stenosis. Why

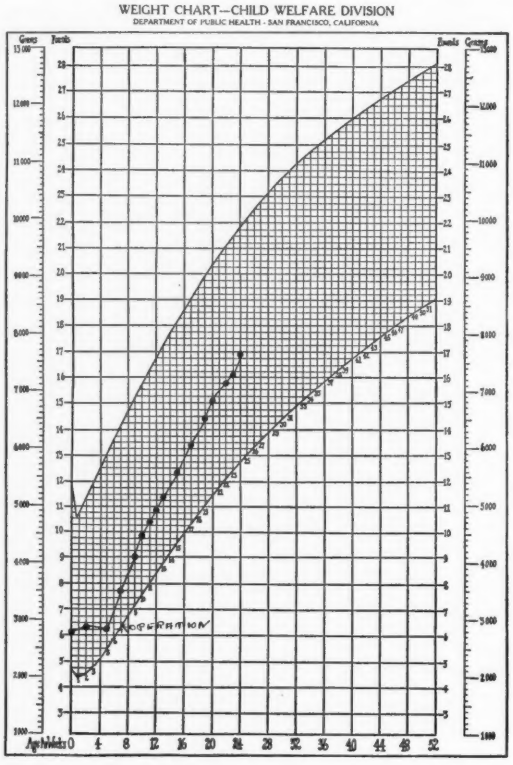

Fig. 194.—Chart IV.

this occurs it is difficult to explain, unless by some chance the muscular ring is not completely severed. It is possible, however, that there may be an even more rapid healing and disappearance of any sign of incision than has been reported by Dr. Martha

Wollstein at the Babies' Hospital of New York, which observations were based on postoperative cases dying later of some other disease.

In the case before us operation was performed when the baby was five weeks old. Vomiting had begun at three weeks, had

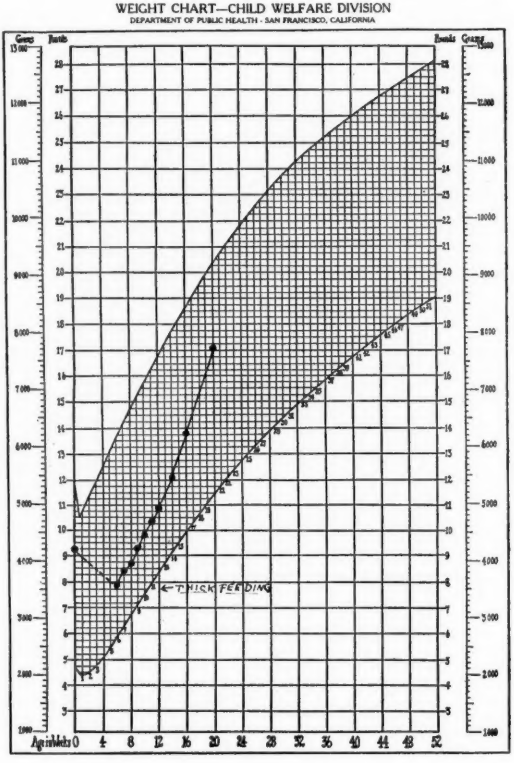

Fig. 195.—Chart V.

steadily increased, and there had been no gain in weight. There was also a marked peristaltic wave and starvation stools. The mother had nursed the infant up to this time, and following the operation breast feeding was continued, complemented by

feedings of Eagle Brand sweetened condensed milk. Progress was fairly rapid, although vomiting persisted. Atropin was administered, but with no effect in lessening the vomiting. The breast milk at this time disappeared, and a combination of Eagle Brand and dried milk was used, similarly without success.

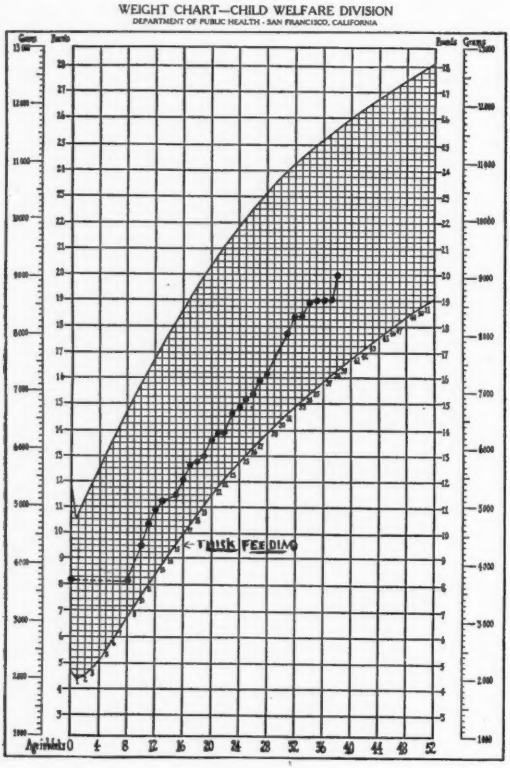

Fig. 196.—Chart VI.

Therefore thick feedings were instituted, with a formula of fat free milk 24 ounces, water 20 ounces, cream of wheat 7 tablespoonfuls, lactose 2 tablespoonfuls, 5 ounces—six feedings. Vomiting practically ceased and the weight increase was satisfactory (Fig. 196).

A somewhat similar case is one of failure to gain, but with the presence of a marked peristaltic wave following operation, however, with no vomiting. The child was operated upon at the age of six weeks, weighing 8 pounds. His birth weight had

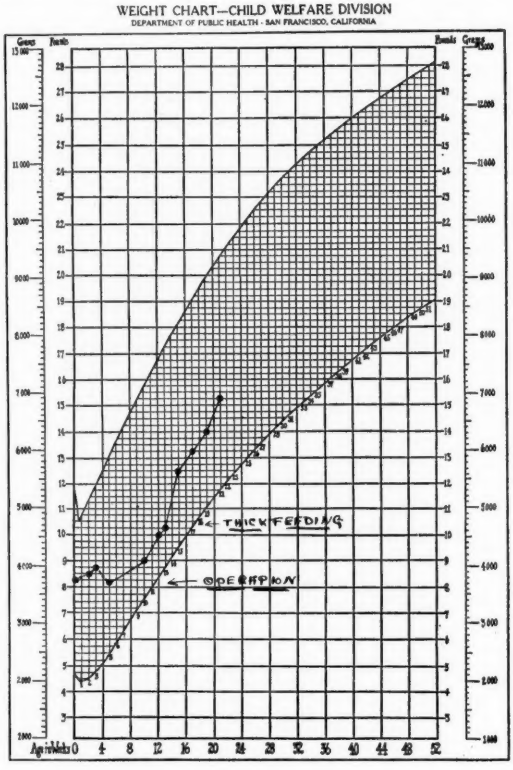

Fig. 197.—Chart VII.

been 9 pounds, 2 ounces. Thick feeding had been persisted in for two weeks without causing a gain in weight, although the vomiting had improved and the postoperative formula was entirely an appropriate one for his age—cereal-water, whole milk, and granulated sugar (Fig. 197). One month later, at the age of

three months, he was, nevertheless, placed on a formula of milk 24 ounces, water 18 ounces, cream of wheat 8 tablespoonfuls, sugar 2 tablespoonfuls. The response was prompt and satisfactory not only as to gain, but as to his general appearance and

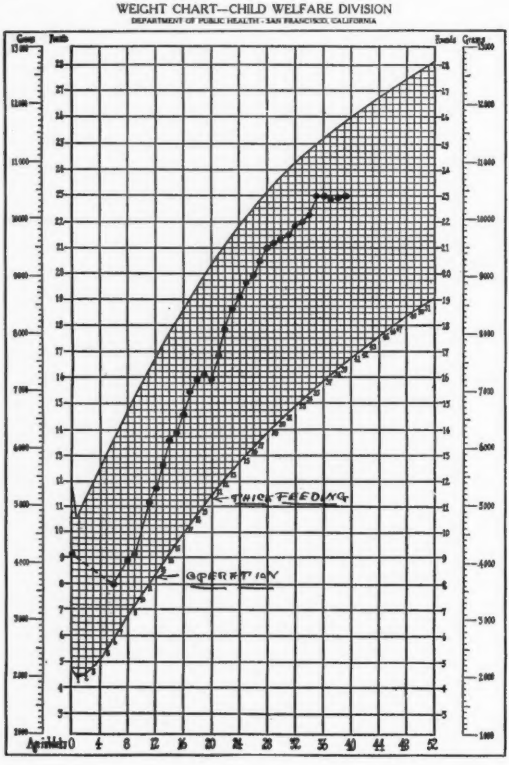

Fig. 198.—Chart VIII.

turgor. The latter point is noteworthy—the extraordinarily good turgor of children fed on thick foods (Fig. 198).

In the preparation of a thick formula there are certain important details which must be noted. Most important is the fact that it is not sufficient to have simply a gruel. The food

must be a mush, as thick as is served to older children—so thick that it will only drop from the spoon, and, when it is cold, that it is solid. Directions may be written satisfactorily in the following formula, varying the quantities, depending on the child's weight and age and in the cereal used, since the flours require much larger quantities than do, for instance, cream of wheat or farina.

Mix . . . of milk and . . . ounces of water together; bring to a boil in the inner half of a double boiler; put directly over the flame. When the mixture comes to a boil, sprinkle in slowly . . . tablespoons of . . . Boil over flame, stirring constantly for ten minutes. Then put the inner half of the boiler containing the food into the outer half in which the water is boiling. Put on the cover; allow to cook one and a half hours. Pour 2 ounces of boiling water over . . . tablespoonfuls of . . . and stir this into the mixture.

Divide into . . . bottles.

In the administration of the food there are several procedures possible. It may be fed from a spoon; second, a hygeia nipple in the end of which a slit $\frac{1}{4}$-inch long has been cut may be placed in the child's mouth, and into this the food spooned from a dish kept in warm water, or the hygeia nipple may be attached to its bottle and the food shaken down at intervals into the nipple prepared with its slit as above. The mechanical features are of importance and should be noted. Upon the details of preparation and administration depends to a large extent one's success in the use of thick foods. The administration of water between feedings is advisable. However, if too large quantities are given, since there is retention of food in the stomach, a dilution occurs and vomiting may result.

Certain cases will be encountered of pylorospasm in which vomiting can be corrected by the use of thick food, but which, nevertheless, fail to thrive because of the low water content. These cases require other measures and present great difficulty, since they are non-operative. Sufficient to state, however, that they are not to be considered for the use of thick food.

CONTRIBUTION BY DR. ERNEST C. DICKSON

FROM THE DEPARTMENT OF MEDICINE, STANFORD UNIVERSITY MEDICAL SCHOOL

THE DIAGNOSIS OF BOTULISM

THERE should be little difficulty in arriving at a diagnosis of botulism in the typical group outbreak in which a number of people develop symptoms of the intoxication within from twelve to thirty hours after having dined together or having eaten portions of some article of uncooked preserved food, particularly if it had been noted that the food had an unusual appearance, odor, or taste. When but one person is poisoned, however, the problem is not so simple, and it may be exceedingly difficult to differentiate at first between botulinus intoxication and other conditions which more or less resemble it.

It must be remembered that the botulinus toxin acts primarily upon the nervous system, and that in the typical case of poisoning there is no early gastro-intestinal disturbance which would suggest food-poisoning. In the majority of instances the initial signs of illness may be said to be a peculiar sensation of lassitude and fatigue, sometimes with dizziness or headache, associated with constipation; in fact, many of the victims attribute their early symptoms to the constipation. Blurring of vision and double vision soon follow, and the patient has difficulty in swallowing and in talking. There is marked general muscular weakness. It is true that in about one-third of the cases there is early gastro-intestinal disturbance, with nausea, vomiting, and diarrhea, but this is not the rule, and is probably the result of the ingestion of spoiled food and not of the toxin which it contains.

The onset of the typical botulinus symptoms varies from a few hours to several days after the toxin is ingested. In a

series of over 200 cases a few occurred within twelve hours, 74 per cent. within forty-eight hours, and all but 8 cases within four days after the poisonous food was eaten; 4 victims, however, first showed symptoms on the fifth day, 3 on the sixth, and 1 on the eighth day. It is important, therefore, that in taking the clinical history of a suspected case of botulism careful inquiry should be made as to all preserved foods that were eaten or even tasted for at least five or six days before the patient became ill.

The majority of single case outbreaks that have been recorded have been caused by the consumption of home-canned food products, apparently because of a peculiar psychologic attitude on the part of many women which induces them to taste the food which they have themselves preserved regardless of whether there are visible indications of spoilage. The following abstracts from case records are typical of what is frequently observed.

Case I.—Mrs. X. noted that the first two of three jars of home-canned corn which she opened were spoiled and had an offensive odor, but believed the third to be good. She tasted about 2 teaspoonfuls of the contents of the third jar before she decided that it also was spoiled. She then threw out the lot to the chickens.

In about five hours after she tasted the corn the patient experienced some distress in the abdomen. In the evening she took laxative pills which caused free evacuation of the bowels in the early morning. In the afternoon, about twenty hours after tasting the corn, she began to have dryness of the mouth, and difficulty in swallowing, and called in her physician.

When first seen Mrs. X. was very restless, almost hysteric, and complained of pressure about the throat, difficulty in breathing, and in swallowing. The mouth was dry and there was much thick mucus in the pharynx which she could not raise. Articulation was very indistinct. Inability to swallow and to talk soon followed, and respiration became very labored. There was no nausea or vomiting, and no diarrhea. The temperature was normal or subnormal throughout, and the pulse varied from

100 to 120 per minute. Except for the hysteric attack at the onset and coma for a short time preceding death, mentality was clear. Death occurred from respiratory failure.

A number of chickens which ate the discarded corn developed typical fowl botulism (limber-neck) and died. Bacillus botulinus was recovered from the contents of the gizzard of one of them.

Case II.—When Mrs. H. opened some home-canned asparagus she noted that the contents of the jar "were a little sour," but nevertheless she drank the juice, and placed the stalks on the stove to cook. While the asparagus was cooking an offensive odor was given off.

About six hours after drinking the asparagus juice the patient became nauseated and vomited repeatedly. She was first seen by a physician on the fourth day of illness. At that time there was diplopia, dimness of vision, strabismus, and blepharoptosis. The pupils were dilated and failed to react to light. Speech was impaired, there was difficulty in swallowing, the mouth was dry, and there was accumulation of thick mucus in the pharynx. There was persistent constipation. Marked muscular weakness and inco-ordination of muscle movements in the arms were noted. Death occurred from respiratory failure.

A son who ate the cooked asparagus did not develop any signs of illness.

Case III.—Mrs. R. opened a jar of home-canned string beans and noted that there was an unusual odor. She tasted one pod, and decided it was good, but when she began to cook the beans the odor became more pronounced, and after "nibbling" another pod, she decided they were spoiled and threw them out.

On the following day the patient did not feel well, she was weak and dizzy and had headache. Next day, the second after tasting the beans, she was nauseated and so weak she could not get up. There was free bowel movement after calomel and salts. During that day she was told that all the chickens which had eaten the discarded beans became ill with "limber-neck,"

and for the first time associated her illness with the spoiled beans and consulted a physician.

On examination it was noted that there was bilateral blepharoptosis, diplopia, slight difficulty in swallowing, and marked difficulty in pronouncing certain words. On the following day (the third) the ptosis was more marked, speech was more difficult, and the patient could not swallow solid food. On the fifth day she died from respiratory failure.

The patient was entirely conscious throughout her illness. There was no pain and no sensory disturbance except a sensation of numbness of the lips. The temperature was subnormal for a time before death and the pulse was rapid. On the last day of illness the leukocyte count was 17,600, of which 86 per cent. were polymorphonuclear neutrophils, probably due to beginning bronchopneumonia which was demonstrated at necropsy.

Bacillus botulinus was recovered from remnants of beans in the crops of the chickens which died.

Case IV.—Mrs. W. noticed that one of a number of jars of string beans which she had canned two weeks previously was bubbling gas and leaking. She tasted one of the pods and noted that it was "slightly sharp," and when she began to heat them a strong disagreeable odor was given off. She then threw the beans into the chicken run.

On the following day a number of chickens were ill, could not lift their heads, and were apparently blind. On the third day after she had tasted the beans Mrs. W. was weak and tired, could not open her eyes, and had double vision. She said she felt as if she were acting like the chickens did. Her mouth and tongue were dry, and she had difficulty in swallowing and in talking. There was no nausea or vomiting, but the patient was dizzy. When she tried to walk she raised her feet high "as if going upstairs" and was unsteady, "as if on ship-board."

The illness lasted for several days, during which the patient spent most of the time in bed, but she gradually recovered and was well within a few weeks. She summed up her symptoms in the words "everything that I tried to do was a great effort."

Case V.—Mrs. H. tasted a small portion of bean pod from a jar which she had just opened, and in which the contents appeared to be especially well preserved. There is no record that she noted any unusual odor, but the taste was sharp and irritating, so that she spat out most of what she had taken into her mouth. A very small amount was swallowed.

When the beans were placed upon the stove to cook a very offensive odor was given off, and the lot was then discarded.

When she first got out of bed on the following morning Mrs. H. was dizzy and staggered, and felt weak. She complained that she could not see clearly. In the evening of the same day her symptoms had become so much more severe that she consulted her physician, but was able to walk with assistance to and from his office, a distance of several blocks. At that time she was greatly excited, almost hysteric, and very tired. Examination showed that both pupils were widely dilated and reacted sluggishly to light, there was some incoordination of muscular movement, and the pulse was 100 per minute. Nothing else abnormal was observed. There had been no nausea, vomiting or diarrhea, and no pain.

Early in the morning of the second day Mrs. H. complained that her tongue was swollen and that she had difficulty in talking. Later in the day there was bilateral blepharoptosis and difficulty in swallowing, the patient vomited several times, and there were several bowel movements. Toward evening speech became unintelligible and she suffered from severe strangling spells which were induced by attempts to swallow and to raise the thick mucus from the pharynx.

There was persistent restlessness and insomnia, but no pain and no disturbance of mentality. The temperature was normal until just before death, when it reached 102.6° F. (rectal). The pulse varied from 100 to 120 per minute. Death occurred on the fourth day after the beans were tasted.

An unfortunate sequel to this outbreak was that a neighbor who had canned the beans and who had given them to Mrs. H. was accused of having poisoned her, and local feeling became so acute that she was forced to move to another city.

The last case record to be abstracted is selected from a group outbreak in which 6 persons were poisoned by eating imperfectly cooked, spoiled, canned spinach; 3 of the victims died. This record is included because it illustrates the long interval which may elapse before the development of the symptoms, and also the difficulty which would have arisen in determining the cause of his illness had he been the only person poisoned at that time.

Case VI.—Mr. J. M. was a patient in hospital, convalescent from a successful herniotomy. On October 14th he was one of a number of persons who ate the spoiled spinach which was proved to be the cause of the outbreak of botulism. On October 16th he was allowed to go to his home in another city, and it was only when all persons who had been in hospital at the time the spinach was served were traced and interviewed that the story of his illness became known.

Mr. M. stated that he felt perfectly well when he got out of bed on Saturday morning, October 16th, but that he was very tired at night. On Sunday, Monday, and Tuesday he was weak and complained that his vision was blurred. About that time he became very constipated and had much gas in the bowels, but was partly relieved by taking laxatives. On October 19th, five days after he had eaten the spinach, he began to have difficulty in swallowing and strangling spells were induced when he attempted to swallow. There had been no pain, nausea, vomiting, or diarrhea.

The patient had heard of the outbreak of food-poisoning at the hospital, but did not attribute his own illness to that cause. He came under observation on October 24th, ten days after he had eaten the spinach.

At that time there was still blepharoptosis, but the pupils were normal in size and reacted to light. The tongue was coated and the breath had an offensive odor. The patient was still constipated. There was some difficulty in swallowing solid food, but no strangling spell. He was very weak, but there were no signs of paralysis and the skeletal reflexes were normal. Bacillus botulinus was recovered from the stool.

In the early stages of botulinus poisoning, when about one-third of the victims show signs of acute gastro-intestinal disturbance with nausea, vomiting, pains in the abdomen, and diarrhea, it is not possible to make a definite diagnosis of the intoxication. In group outbreaks there is usually indication that some form of food-poisoning is responsible, but differentiation between bacterial food infection of the Bacillus paratyphosus, B. enteritidis type of bacteria, and botulism may be extremely difficult. A careful survey of the probable cause of poisoning may give a clue; bacterial food infection is usually transmitted by infected fresh food, more often of animal origin, which does not show signs of spoilage, whereas botulism is always caused by uncooked or imperfectly cooked preserved food which usually shows more or less marked spoilage. Moreover, the continued absence of fever should suggest that bacterial food infection is not the cause, and should lead one to think of botulism. The onset of disturbances of vision, blurring or double vision, or blepharoptosis in such cases will usually confirm the diagnosis.

When single cases occur the problem is still more difficult. The sudden onset of nausea and vomiting associated with pains in the abdomen and diarrhea occurring within a few hours after a meal is not pathognomonic of food-poisoning. Any acute abdominal condition—appendicitis, cholecystitis, cholelithiasis, gastric ulcer, etc., certain chest conditions, such as pleurisy and angina pectoris, and many acute infectious diseases—may produce symptoms of a similar nature. Here again, however, the absence of fever and of leukocytosis should attract attention, and one should bear in mind that botulinus intoxication may be at fault.

With the onset of the typical botulism symptoms, however, the diagnosis should be relatively easy, whether they be preceded by acute gastro-intestinal disturbance or not. A sensation of weakness and fatigue, vertigo, uncertain gait, muscular weakness, blepharoptosis, mydriasis, loss of pupillary reflex to light, diplopia, dryness of the mouth, difficulty in talking and in swallowing, persistent constipation, normal or subnormal temperature with rapid pulse, intact skeletal reflexes, and absence of sensory

or mentality disturbances, are all characteristic signs and symptoms of botulism, and together constitute a clinical picture which, once seen, cannot be forgotten.

The condition which most closely resembles botulism is belladonna-poisoning, but this can usually be distinguished by the excitement and delirium which characterize belladonna-poisoning and are not usually observed in botulism.

Epidemic encephalitis, cerebrospinal syphilis, acute poliomyelitis, the various types of bulbar paralysis, and toxic ophthalmoplegias must also be differentiated, but they may usually be excluded by the taking of a careful history, the course of the disease, and the results of the clinical laboratory tests. Botulism is characterized by a normal or subnormal temperature except when complicated by infection and a rapid pulse. There is nothing characteristic in the results obtained by blood-count, or examination of the urine or cerebrospinal fluid. The Wassermann test is negative. The blood-pressure is normal. There is no rapid wasting of the skeletal muscles, and, despite the marked muscular weakness, the skeletal muscle reflexes are intact.

It has been recorded that the botulinus toxin may be demonstrated in the blood of botulism patients by injecting the blood-serum into white mice. I have not been able to confirm this observation on two occasions when there was opportunity to try it.

In every instance when food-poisoning is suspected the services of a competent laboratory should be secured, and a careful epidemiologic investigation should be made. It is important to remember that the onset of the symptoms of botulism may be delayed for four or five days after the poison is ingested, and that it may be necessary to extend the inquiry as to a possible source of poisoning for at least that length of time before the patient complained of illness. All preserved food which might have been the cause of poisoning should be carefully noted, and, if possible, samples should be obtained for laboratory tests. If remnants of the food are not available, it may be possible to obtain a specimen of vomitus or of washings

from the stomach from the victims of the poisoning, or to obtain the contents of the crops or gizzards of chickens which have developed limber-neck after eating the discarded food. If bowel evacuation can be obtained, the stools should also be examined.

The demonstration of the botulinus toxin in the food or in the washings from the stomachs of the patients conclusively establishes diagnosis. If it is obtained from the contents of the crops or gizzards of chickens which have developed limber-neck after eating the discarded food, it affords strong presumptive evidence that the human patients are suffering from botulism, particularly if the crops or gizzards still contain remnants which can be identified as being the same kind of food as was consumed by the human victims. From analogy in animals it is possible that Bacillus botulinus may be recovered from the stools of human beings who are not suffering from botulinus intoxication, but I have never seen a case in which the organism was thus recovered unless the patient was suffering or recovering from a typical attack of poisoning.

In conclusion it must be emphasized that the incidence of botulism in this country is not great. From all the records which are available in the literature of the past twenty-five years and from careful investigation of all suspected outbreaks during the past five years it has been possible to collect less than 110 outbreaks in which human beings have been poisoned. The mortality in these outbreaks has been very high, almost 64 per cent., but the number of persons who have died from botulinus intoxication is insignificant when compared with many of the other preventable diseases.

CLINIC OF DR. EUGENE STERLING KILGORE

ST. LUKE'S HOSPITAL

CARDIAC NEUROSES

THE importance of fear in the genesis of neuroses gives peculiar interest and importance to those which enter about the heart. Every school child now knows the dependence of life upon the performance of the heart, and nearly every one can recall instances of sudden death attributed to heart failure. The average intelligent layman even knows something about angina pectoris, and often at the club or card party conversation will turn to leaking valves, murmurs, irregularities, blood-pressure, and so forth. Such direction of popular attention cannot fail to heighten the keenness of our perception for all sensations referred to the heart or its locality, and once any such sensation is felt, to promote the development of fear in association with it. And so we find the soil prepared by modern civilization remarkably favorable to the growth of neuroses and especially cardiac neuroses.

The following case well illustrates this point—how suggestion may initiate and elaborate a cardiac neurosis in a subject who was by nature not at all neurotic.

Case I.—Male, bookkeeper, single, aged thirty. The family history is excellent. Of infectious diseases he remembers only a light attack of scarlet fever at the age of ten. No tonsillitis, rheumatism, chorea, or venereal disease. Always strong and well and moderately athletic. Has used alcohol, tobacco, and coffee in moderation. In 1917 he enlisted in an engineer regiment, was never in combat, and continued in the army until seven months ago, when he was honorably discharged.

During the last year and a half in the army there was some intermittent digestive trouble—gnawing epigastric pain two or three hours after meals, relieved by food; some pyrosis; rarely a little vomiting, but never hematemesis; no weight loss, jaundice, melena, or syncope (except one hot day when, while standing at attention, he was a little faint for a few minutes, but did not fall). When discharged he felt well, believed himself sound physically and, since the medical officer was very busy, missed the customary final medical examination.

A month later, still feeling perfectly well and in search of employment, he applied at a hospital for a position. As a preliminary to final acceptance he was given the required medical examination by a member of the staff, and was then promptly rejected on account of "systolic murmur and auriculoventricular heart-block." The doctor was vastly interested in his find and called several colleagues to "listen in"; and the patient, who admits that up to that hour he "had not known that he had a heart," was an amazed and alarmed auditor of the ensuing discussions of his "case." The hospital graciously accepted him as a *patient*.

In the following six months which preceded our examination he was hospitalized almost continuously, spending a large part of the time in bed, and was treated not for digestive trouble, which has recurred off and on, but for heart disease. He has now become conscious of the heart's action practically all of the time, describing it as beating regularly a few times, then suddenly stopping, to go on again in a moment with a "big bump," and this often being followed by a momentary pain "like an electric shock," diffusely through the left arm. No other pain. Tired "all the time," and somewhat short of breath on stair-climbing. The possibility of being able to work has drifted out of his mental horizon. Often dizzy for an instant after rising from a stooping position; no definite syncope. Sleep variable. Avoids lying on the left side by advice of doctors. No cough, edema, change of weight, disturbance of urination, or other symptoms.

Examination shows a tall, well-built, healthy looking young

man, not at all a neurotic type, and in general the physical examination is entirely negative except for the heart. Percussion is normal, sounds of good quality and regular in short runs of four or five beats (at a rate of about 75 per minute) separated by pauses of apparently two ordinary intervals. A single very faint sound occurs at the beginning of each pause—so early as to suggest reduplication of the preceding second sound, but other second sounds are not reduplicated. Jugular waves not clearly seen. A very soft systolic murmur all over the precordia. Pulses normal except for intermittence. Blood-pressure 140/90. Hastily climbing four flights of stairs (much more exercise than he has allowed himself in the past six months) produces a regular pulse, rate 120, blood-pressure 160/90, some increase of the systolic murmur, and the ordinary tachypnea, without evidence of distress. Exercise reaction subsides with resumption of arhythmia in two minutes.

Urine, blood, Wassermann, and chest *x*-ray (2-meter plate) negative. Gastro-intestinal *x*-ray study shows typical findings of duodenal ulcer. Electrocardiogram shows ventricular premature contractions, with conduction time normal.

Diagnosis: Duodenal ulcer, premature contractions, functional murmur, cardiac neurosis.

Now it is not to be supposed that this man's premature contractions began on the day when by chance they were first discovered and were mistaken for heart-block. They had existed probably for a long time without constituting any recognizable impediment to or hazard in connection with exertion. And it is possible, therefore, to charge the whole of his present disability to the psychoneurosis. This began on the day of that medical examination and was undoubtedly caused by the circumstances connected with it. Having once obtained the conviction of serious heart disease and focused his attention in that direction, he soon learned to feel the irregular action, the pain, and so forth, and these, in turn, augmented his fears.

As to prognosis, we cannot as yet entirely ignore the functional cardiac disturbance. We are now in a period of reaction against the overemphasis formerly placed on systolic murmurs and un-

differentiated cardiac arhythmias; and the present tendency is to regard a murmur or an irregularity such as this as of little or no consequence unless other evidence of pathology can be found. But as yet we have no definite knowledge of the comparative incidence in middle or advanced age of circulatory degenerative processes among those who in early adult life have shown these findings. We *are* sure, however, that premature contractions may exist through a long comfortable life and that certainly they constitute no threat for the immediate future. And there is no reason to suppose that any hidden pathology or tendency to subsequent pathology which they represent will be aggravated by any ordinary exercise which is good for young men in general. So that for practical purposes, therefore, his prognosis depends upon the success of psychotherapy.

Now effective psychotherapy must go further than the simple assurance that he is all right. We must first convince him that we know what we are talking about. Here our *x*-rays and electrocardiogram, which were really not essential to diagnosis, are a great help. He is intelligent enough to understand the main features of his electrocardiogram and see the difference between it and another tracing of genuine heart-block. The positive evidence we have secured of his duodenal ulcer will give him further confidence, which should grow as we are able by dietary régime to relieve his digestive symptoms. And then, after he understands and accepts our explanation of his experience, he should be led on to comprehend something of the mental "hinterland," and his co-operation should be enlisted in the task of releveling the parts grooved by erroneous thought and feeling habits. At the same time he should be guided and encouraged in the gradual resumption of the activities normal to his age and athletic build. The results which may be obtained from such treatment are exemplified in the next case, which was much more severe.

Case II.—Was first seen in March, 1917, when he was referred by Doctor Robert T. Legge. He was then a student,

single, aged twenty-four, with good family and past history—no tonsillitis, rheumatism, scarlet fever, or venereal disease. Habits were excellent, and up to 1915 he had been a good student and tennis player. In the summer of that year, following his junior year in college, he was camping in the Sierras. After resting about camp one rainy day he was sitting by the campfire after supper, when suddenly he felt weak, air-hungry, slightly dizzy, and broke out in a cold sweat coincidently with his first attack of rapid heart action. This ceased in a few minutes as suddenly as it had begun, but he was profoundly frightened and oppressed by the sense of his remoteness from help at a time when, according to his notion, it might be instantly needed to save his life. In this state of mind he scrambled into the saddle and dashed down the long mountain road in search of a doctor. The doctor gave him medicine and forwarded him at once to the city, where he saw several "specialists," and was given digitalis and other drugs and kept in bed several weeks, although his heart all this time seemed to be acting normally.

In the following two years although there were only two or three repetitions of rapid heart action, each lasting only a few minutes, he was haunted incessantly by the fear of heart failure; and always this fear was associated with the original sense of lonely helplessness. He could not endure being left alone; could not walk a hundred yards alone, and had been unable to go to sleep without holding his mother's hand. For a time he hired a companion to conduct him from class to class, but soon gave up college and had done practically nothing in the two years preceding our examination.

There were few other symptoms. A little flatulence or pyrosis occasionally had prompted him to restrict his diet, and he had lost in weight from 145 to 120 pounds. Still he felt well physically, had no pain, and could climb hills, etc., with ease provided only he had company.

Physical examination showed marks of nerve strain. He was of small stature, "high-strung," nervous and anxious looking, with cool extremities, and exaggerated tendon reflexes. The heart, with basic rate about 60, showed rather marked sinus

arhythmia both with and independent of respiration. Blood-pressure 128/90. Other parts of examination, including ophthalmoscopy, urine, blood, Wassermann, feces, electrocardiogram, teeth x-rays, and 2-meter chest plate entirely negative. There was moderate gastric hyperacidity, and the gastro-intestinal x-ray examination showed some spasm of the duodenal cap, possibly indicative of incipient ulcer.

Although we never observed one of his attacks, his account was circumstantial enough to warrant the diagnosis of paroxysmal tachycardia. It was perhaps but a single heart fiber that usurped at times the pace-making function; certainly all the evidence pointed to a generally healthy state of muscle and valves; and it was clear that his invalidism was all due to the phobia. Now, more than once he had been told as much by medical advisers, and had been given a hearty slap on the back and told to "forget it." But, of course, his wounds were too deep to be healed by any such off-hand methods. He knew this as soon as the situation was explained to him (he had studied psychology) and was ready to co-operate in an extended and serious effort to restitute his subconscious personality.

After consideration of his studious and analytic habits of mind, it was decided first to seek orientation of his ideas relating to his own condition through a thorough understanding of hearts and heart disease. He dissected the sheep's heart. He recited after reading chapters on gross and microscopic cardiac anatomy, cardiac physiology, and pathology. He sketched from microscopic sections of good and bad heart muscle. He studied physical diagnosis and, in a quasiprofessional capacity, went into the wards and examined and reported on heart cases, and thereby observed the disabling effects of fear in some with minor defects and the absence of fear in others with serious organic disease. And finally, after studying the arhythmias, he was introduced to and exchanged confidences with others who had paroxysms of tachycardia like his own, but were free from neuroses.

While all this was going forward he began to practice walks alone. At first his mother, who accompanied him, stopped at

the front door and let him come alone through the corridor to the office. Next day he would come alone from the car-step fifty yards away, then from a block away, and so on. His first attempt to round a city block alone was a failure. When nearly half-way around he collapsed with cold sweat and trembling knees, and *ran back*. If I had felt that reproaches were in order, I could not have administered them to the pathetic picture of shame and discouragement which he presented. I expressed the sympathy I felt, and also the simple assurance that with a little more time and more gradual progression he would succeed.

He did. In two months he was able to resume University work; and since then, without interruption, he has completed his course, taken graduate work in the East, and in the last three years has climbed rapidly in a business career. He now runs the advertising department for a large eastern concern, superintending the work of seventeen assistants, and spending over $2,000,000 annually.

His return to normal life was not easy or entirely painless. Although after that failure in the first attempt to round the block alone there were no more "Waterloos," there were many battles and considerable suffering, but always with victory on his side. A corner-stone in his success was his conscious attitude toward this distress. He was asked to ignore it completely, both for the present and the future, and to regard as his goal *not freedom from discomfort, but the ability to perform.* Of course, his relief from torment followed gradually his escape from bondage, and he knew it would; but, like Myltyl and Tyltyl, he found his bluebird by honest abandonment of the direct search.

When I saw him last autumn he had just returned from another, and this time a strenuous, trip in the high Sierras, feeling and looking splendidly. He still has occasional short paroxysms of tachycardia, and with them comes the decrepid ghost of the old phobia; but this is always banished with the greatest ease by exercise of his habitual disregard for the thing and insistence on performance of whatever he is doing. The rate of his paroxysms fortunately is not excessive, and if they

occur while he is walking he does not even permit himself to stop for rest.

Some Freudian enthusiasts to whom I recently related this story were unsatisfied with the results and skeptical about the future of this patient because I had not traced his trouble to a sexual origin. Now, with the Freudian method itself I have no quarrel, but I do object to any such absurd commitment to routinism. There may be cases of cardiac neurosis whose best or perhaps only way out is through the psycho-analytic methods of Freud and his followers; but it is one of the serious obstacles to the more general approval of these methods that their proponents are often unable to see or unwilling to admit the sufficiency, in most such cases, of the direct and simple methods of teachers like Dubois.

Well. I have described two severe and unusual cases. But the minor cardiac neuroses are very common indeed. In some there is pain which we have no hesitation in calling "pseudo-angina," in others palpitation, with or without some trivial irregularity of heart action, and in others minimal sensations (cold extremities, poor endurance, dislike to lie on the left side, dizziness, faintness, etc.), or no sensations at all, but with vague fears concerning the heart.

There may or may not be demonstrable pathology, either structural or functional, for organic disease is no protection against psychoneuroses, although it usually protects the patient's chart from bearing such a diagnosis. In the presence of severe organic disease there is usually enough real distress to absorb the attention of patient and doctor and make us pretty much forget the psychologic element and its possible contribution to the total trouble. It often does contribute more than we suspect. And when we do recognize it, we are often prone to combat it with such weak transparencies as, "There is nothing to worry about you will be all right." Your weak-minded patient may assimilate this, but undoubtedly a common result so it is simply to undermine confidence in the doctor—at least of far as his truth telling is concerned. The intelligent patient may inwardly thank him for what he regards as a traditional

and benevolent effort to be a successful liar, but he will think his own thoughts, and these are often worse than the truth. Some will mysteriously try to co-operate in deceiving themselves. Internal mental tension is thus created, with the result that the "inner man" becomes still more afflicted with sensitiveness and fear. To illustrate:

Case III.—Two years ago I saw a middle-aged Jewess with undoubted angina pectoris. Several blood relatives when about her age had died suddenly of heart trouble. Like several previous consultants, I had been warned by the family physician and by the husband, who ambushed me at the front door, to be extremely careful not to alarm the lady by reference to her real condition. She was intelligent and, of course, knew all about it; and during the examination I could see that she was calmly waiting for me to proceed with the usual camouflage. How futile was my rôle! It was actually worse than futile, because it meant furthering the patient's efforts at self-deception and repression—so I balked. In presence of doctor and husband I told on them; then stated my conviction that in this thing her intelligence would not permit her to be deceived by others or by herself, that such efforts were harmful, and that she could be benefited by a mental house-cleaning in which she would boldly and resignedly face things at their worst, dissipate the tense atmosphere of pretended ignorance from her surroundings, and then focus attention on the practical means at hand for making the best of the situation. Her expression spoke enthusiastic acceptance of the proposal; there was neither surprise nor shock at mention of angina; and then, when I described worse cases that had improved, she needed no persuasion to adopt a hopeful attitude.

On leaving the house I had some misgivings about the husband's second ambush at the front door, but, instead of an attack, I received a very warm handshake and thanks for my remarks. The doctor, too, remained my friend; and today the patient, who has already outlived our anticipations, has considerably less pain and more freedom of action.

Of our many debts to Richard Cabot none is greater than that for his teaching of the value of candor in the practice of medicine. Every medical student should read the illuminating and entertaining account of his experiments with truth in medicine (American Medicine, February, 1903). He shows that truth telling does not mean a bald and brutal recital of terrifying facts or supposed facts. That is often the most effective means of implanting damaging misimpressions.

Anxiety in some is aroused by their visceral sensations alone, but usually it is amplified or caused entirely by suggestion, direct or indirect, from outside sources. If the source is a respected medical authority, the effect is prodigious. And the doctor who is the cause of the mishap is innocent not only of wilful wrong, but also often of deficient knowledge. I have been appalled at times to find how my own words have been misinterpreted. The thing may happen without even a word from the doctor.

Case IV.—A big-case lawyer who had known for years that his blood-pressure was elevated, but who carried it well, enjoyed work and had good prospects for prolonged activity, returned from a trip prepared to retire from his profession and devote his attention to health seeking. He had no important complaints, and I was at a loss to understand until I learned from a business associate of his that while away he had consulted a doctor who, among other things, had read the blood-pressure. The doctor did not even announce the result, but his face for a moment wore an expression which the attentive lawyer interpreted in his own way!

I have taken fewer blood-pressure readings since then; and, when I do take them and wish to avoid discussing the results, I try to work quickly, to look a bit bored at the instant of reading the scale, and to ask, while the air is still sizzling out of the cuff —"How are your bowels?"

In **conclusion,** the points to be emphasized are: first, the prevalence of cardiac neuroses not only among those with essentially sound hearts but also in connection with more or less

grave circulatory disorders. If we could measure the total burden to civilized people of their neuropsychic reactions centering about the heart, it would probably exceed that due to actual cardiac damage. Second, the importance of suggestion in developing these neuroses, especially when it is the ill-considered advice of a doctor. Digitalis and exercise restriction are not to be belittled in value, but how we can traumatize certain patients with them if we are not careful! What an instrument of torture a stethoscope may be! Third, the necessity to individualize in treating these neuroses. Each case has its problems. Really complete histories are often hard to get even with time and patience, and therein often lies the secret of the cure. And, fourth, that a bond of sympathy and confidence is indispensable to successful treatment, and in securing this a well chosen candor is often the greatest help.

CLINIC OF
DR. ALFRED C. REED
DR. HARRY A. WYCKOFF
MISS C. C. PRINGLE, TECHNICIAN

STANFORD UNIVERSITY HOSPITAL

CLINICAL NOTE ON OCCURRENCE OF OXYURIS INCOGNITA

IT is our desire to place on record a short note on the occurence of Oxyuris incognita. The cases here presented have been evenly distributed through the months of the year, including the winter months. Since Kofoid's original description in 1919 little additional information has appeared respecting this small round-worm. In the past two years we have had under observation in the Clinic of Parasitology and Tropical Diseases at Stanford 25 cases of this infection. While there is no reason to believe that the worms are pathogenic, or that any symptoms are associated with their presence, yet it is of interest to note their presence.

C. A. Kofoid first described this parasite in the Journal of the Amer. Med. Assoc., February 22, 1919, under the heading of "A New Nematode Infection of Man." He says, "The ovum is the largest ovum of intestinal worms encountered in human stools. Its dimensions average 95 by 40.2 microns. It is extraordinarily variable in size and proportions, its length ranging from 68 to 133 microns and its diameter from 33 to 43 microns. This new ovum is characterized by two marked diagnostic features that clearly distinguish it from other nematode ova of man. The first is a broad concavity on one face usually concealed by the position of the ovum when floating on urine, so that it appears only as a flattening on that face.

The other feature is the presence of two highly refractive, hyaline, bluish-green globules, flattened asymmetrically, at the two poles of the embryo. They are sometimes combined in one

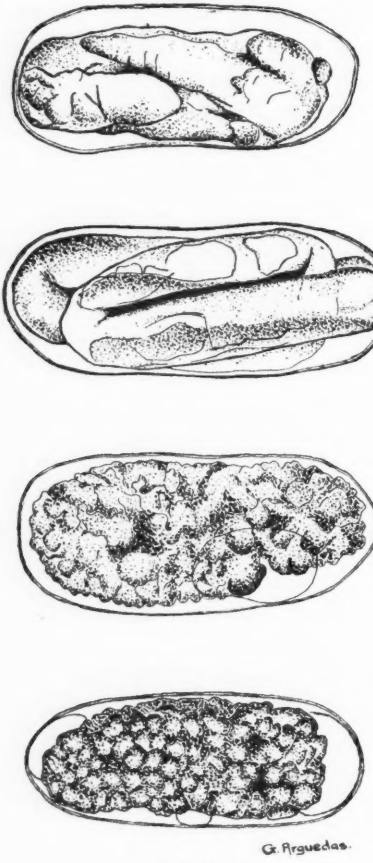

Fig. 199.

large lateral or polar globule, or are broken up into smaller moieties. They are dispersed as development proceeds. The larva partakes of the color of the globules. The egg is a broadly

rounded ellipsoid, with clearly defined, double contoured egg-shell similar to that of the hookworm. In some instances the faintest tinge of brown can be detected in optical sections of the shell. There is sometimes a small irregularity in the contour toward one end on the concave surface, suggestive of an operculum."

Our observations as to size, shape, and color agree with those noted. We also found the number of ova seen in each infection to be very small. The usual average was one ovum to a cover-glass. The granular ovum is found more often than the coiled larval stage. In the microscopic field the eye of the ordinary laboratory worker is attracted at once by the almost crystalline brilliance of the globule. The ovum is so large that even with the low power one can readily see the perfection of detail, and rapidly distinguish it from a certain vegetable cell that closely resembles it in color. The following measurements were recorded on characteristic ova:

118.5 by 38.9 microns.
61.5 by 25.9 "
100.0 by 38.9 "
103.4 by 38.9 "

As has been indicated, our series have appeared equally distributed through the year, the usual number of cases appearing in December and January, as well as in the summer. It is impossible to draw any conclusion as to seasonal incidence whereby one might have a suggestion as to the intermediate host or source of infection. Our series indicates that the percentage of infection is fairly high, but that no seasonal or climatic factors can be assumed to have an influence on the infection. We have not been able to obtain the adult worm, although a variety of therapeutic procedures were used.

Review of the patients shows no agreement between symptoms, clinical diagnosis, and this nematode infection. One patient, indeed, gave an average of 5 per cent. eosinophils in the absence of other parasites or other discoverable reasons. This was the only indication we noted of a possible reaction to the presence of the worm. The infections were easily re-

moved by treatment and disappeared under treatment for coincident amebiasis. We were unable, however, to recover a single adult worm, indicating probably that the worm exists in small numbers only, and that it is extremely delicate and easily disorganized.

In reporting our 26 cases of infection with Oxyuris incognita only the barest details will be noted. All of the patients had been residents of San Francisco for at least three months preceding examination. Cases I to VI lack any data of interest, as they could not be studied or kept under observation.

Case VII (113,849): An Italian laborer, aged twenty, a psychopath. His stools showed, in addition to the Oxyuris, the presence of Giardia, Ascaris, and Trichuris.

Case VIII (113,891): An Italian woman of twenty-six who had lived many years in the far East and the Philippines.

Case IX (S. F.): Born and always lived in San Francisco. Italian parentage. Age sixteen. Has an old hemiplegia of obscure origin. Oxyuris was an incidental finding, as was the case in all the patients here reported. Otherwise laboratory findings were normal.

Case X (Mrs. M. W.): American housewife, aged twenty-eight. Entire history and present status is of pelvic inflammation. Stools showed Giardia, Entamœba coli, and Oxyuris incognita. Treatment for amebiasis removed all parasites but the Giardia.

Case XI (T. H.): English clerk, aged thirty-four. In San Francisco fifteen years. Entire pathology limited to a petechial skin disorder and severe dental infection. Stools showed Entamœba coli in addition to Oxyuris.

Case XII (113,852): Canadian baker, aged thirty-three. Gastro-intestinal trouble and bad tonsils. The symptoms were nausea, vomiting, vertigo, and constipation. No pain. All laboratory examinations and *x*-ray studies negative. Stools showed Entamœba coli in addition to Oxyuris.

Case XIII (113,607): A Spaniard, in San Francisco eleven years. Aged twenty-five. Baker's helper. General ill health most of his life, centering in gastro-intestinal tract. Stools showed Trichuris and hookworm in addition to Oxyuris.

Case XIV (109,988): Canadian housewife, aged forty-five. Frequent colic with indigestion and diarrhea. Besides Oxyuris the stools showed Giardia.

Case XV (102,168): A Swiss laborer, aged fifty. Complained of indefinite intestinal pain especially after eating. *x*-Rays negative. Stools showed unidentified amebic cysts in addition to Oxyuris.

Case XVI (98,448): A Norwegian sailor, aged fifty-two. Suffered from lues, aortitis, and hypertension. In San Francisco for past twenty years. Only parasite was Oxyuris incognita.

Case XVII (105,876): Italian laborer, aged thirty-eight. Indefinite gastro-intestinal history. Objective examinations and *x*-rays negative. Stools showed Strongylus larvæ in addition to Oxyuris.

Case XVIII (99,363): Italian laborer, aged thirty-seven, in the United States eighteen years and in San Francisco three years. Indefinite indigestion with negative objective examinations. Stools showed hookworm and Oxyuris.

Case XIX (106,298): An American student, aged thirty. Had dysentery in United States Army in France. Stools showed amebic cysts and Oxyuris.

Case XX (100,418): American carpenter, aged twenty-one. Hemicrania and mitral disease. Only parasite was Oxyuris.

Case XXI (103,350): An Italian laborer, aged twenty, in United States and San Francisco fourteen months. Had constipation and neuroric symptoms. Blood averaged 8 per cent. eosinophils. Stools showed Giardia, Entamœba, Trichuris, and Oxyuris.

Case XXII (101, 192): A Spanish laborer, aged forty-three. Complained only of constipation. Only parasite was Oxyuris.

Case XXIII (102,707): American ex-miner, aged eighty. Has a Type 2 arthritis. Only parasite was Oxyuris.

Case XXIV (47,324): A Spanish housewife, aged thirty. Tertiary lues and pelvic inflammation. Achylia and ptosis. Had borne eight children. Only parasite was Oxyuris.

Case XXV (109,084): A Danish janitor, aged fifty-six. In the United States thirty-five years and in San Francisco

twenty years. Hypotension and neurasthenia. Oxyuris was the only parasite.

Case XXVI (81,313): American housewife, aged twenty. Very minor indefinite symptoms. No objective disorder found. Blood averaged 5 per cent. eosinophils. Oxyuris was the only parasite.

CLINIC OF
DR. ERNEST H. FALCONER
DR. LAIRD M. MORRIS

UNIVERSITY OF CALIFORNIA HOSPITAL, MEDICAL OUT-PATIENT DEPARTMENT

SOME UNUSUAL TYPES OF SEVERE ANEMIA

IN selecting these few cases of anemia for presentation and discussion it is our desire to point out the practical difficulties one encounters in the study of certain cases if early diagnosis and early classification is too eagerly sought after. It is always wise to make a tentative diagnosis and classification in investigating a case of severe anemia in order better to outline a course of procedure, but to label such a case early and definitely classify it as a certain type of primary or secondary anemia is a temptation to cease efforts toward better confirmation of diagnosis. This is especially true in progressive pernicious anemia, and many physicians, once they arrive at such a diagnosis, lose interest in the case, as treatment offers very little, and the prospect of study and observation over a long period of time of an individual impatient to get well is not an alluring prospect. It is not necessary to label a case as progressive pernicious anemia until a very thorough and exhaustive investigation has been carried out. The possibilities in this direction are manifold, including a very careful history and an investigation of all the organs and systems other than the hemopoietic system. The gastro-intestinal and nervous systems should be thoroughly studied. Unfortunately, we have no methods or tests for studying the relation of liver and splenic function to the bone-marrow. When we know so little concerning the etiology of pernicious anemia we surely have a right to defer a final diagnosis

through weeks and months, if necessary, in the hope that the original surmise of progressive pernicious anemia will be proved incorrect and some removable cause for the anemia will be found. The question of tempering the patient's reaction to an uncertain diagnosis through this period of time belongs rather to the art than the science of medicine, but it constitutes a problem sometimes difficult to handle, for many of these patients have a peculiar mental irritability that seems to be part of their disease. These remarks may seem to be widely at variance with the idea expressed by many writers on diseases of the blood-forming organs, whose chief aim seems to be to urge early diagnosis and classification. This is, of course, important and should be our constant endeavor, as it then enables us to give an intelligent prognosis and to regulate the patient's life so as to avoid undertakings that are entirely beyond their strength.

While an early diagnosis and classification is desirable, it is not always feasible, as will be seen from 2 of the cases we are about to discuss. At present our criteria for classifying the severe anemias is not sufficient to cover every case. Individual variations due to the influence of heredity, susceptibility to infection, resistance to toxins, perverted metabolism, are factors, which make each case a study by itself and which make rules formulated by group study not always applicable. Such grouping and group study may be of great value, however, as shown by the work of Minot and Lee[1] in grouping pernicious anemia cases into types depending on the degree of hemolysis present, the reaction of the bone-marrow, the clinical course of the disease, the nervous system involvement, etc. Such grouping has a wide range of application and calls attention to cases that otherwise would be overlooked, and it harmonizes entirely with such methods of study as we are discussing here.

Case I is of especial interest because it brings up the question of the relationship, if any, between a severe secondary anemia and progressive pernicious anemia. It also illustrates a type of case referred to by Stengel, of Philadelphia,[2] as a secondary hypoplastic anemia.

This patient, aged fifty-one, entered the University of California Hospital in 1921, complaining of anemia, weakness, and dyspnea. He has always lived in the western United States. In childhood he had scarlet fever when four years of age, "rheumatic fever" at three, ten, seventeen, and fifty-one. Venereal disease denied. The appendix was removed in 1899 (twenty-two years ago), preceded for three years by attacks of abdominal pain. Operation during the seventh attack, which was followed by complete relief. In 1918 rectal operation following hemorrhage from bowels. Nature of the operation unknown. Habits are unimportant except that formerly he drank from 1 to 6 glasses of whisky daily. Present weight 170 pounds, average weight 196 pounds. His present illness has an indefinite onset. He has had slight bleeding from hemorrhoids for twelve years. Small flecks of blood with each hard stool. In 1918 he had a sudden severe hemorrhage from the rectum, followed by some operation of unknown nature, which stopped the bleeding. His physician stated at that time that there was a tumor of the rectum. Subsequent investigation by other physicians failed to confirm this. His hemoglobin after this hemorrhage and operation was 28 per cent., but rose rapidly after iron injections, although patient says he has been sallow and yellow ever since. Has been working as a blacksmith and has felt fairly well up to May, 1921 (seven months ago), when he began to feel weak, tired easily, and had indigestion with flatulence. During this month "rheumatic fever" supervened, many joints were involved in rapid succession, right shoulder, both knees, right wrist, and elbows. In bed two months with practically entire disappearance of joint pains. Has been very weak since this attack. No bleeding except small amounts from the rectum. No paresthesias, but some numbness of the extremities after his fever in May. No sore mouth or tongue.

Examination shows a very well-developed man. Skin has a pale, sallow, slightly yellowish tint, pupils negative. Fundi normal. Mouth: Teeth poor, many have been removed. Pyorrhea present. Tongue: Large, flabby, smooth, and somewhat

glistening. Deep furrows present, mucous membranes of mouth pale, no ulcerations, no adenopathy, thyroid normal, marked pulsation of neck vessels.

Lungs negative. Heart: Cardiac outline enlarged to left 14 cm. from midsternal line in fifth interspace. P. M. I. in fifth interspace just inside midclavicular line. No thrill present. Over the apical area there is a loud systolic murmur lasting through systole, heard best at apex, but distinct all over precordia. Short, faint diastolic at third left chondrosternal junction. Pulmonic second sound accentuated at base and greater than aortic second. Blood-pressure, systolic 156, diastolic 70. Abdomen: Liver edge descends with respirations 2 cm. below costal border in upper right quadrant. Spleen and kidneys not felt. No masses or tenderness. Rectal examinations showed sphincter fair tone, a few small external and internal hemorrhoids on the left, one the size of the little finger, on the right a larger one, the size of the end of the thumb, very tender. Prostate gland of normal size and consistency. The urine is negative except for a few hyaline and granular casts.

Blood-count showed hemoglobin 24 per cent., R. B. C. 3,184,000, W. B. C. 5600. Differential: P. M. N. 66, large mononuclears 1, small mononuclears 31, basophils 2. The red cells show achromia and considerable variation in size and shape. No blasts seen, no stippling. Count of reticulated red cells less than 1 per cent.

Fragility test: Began 0.45, complete 0.28 per cent.

Wassermann in the serum: Negative both antigens.

Stool examination negative. No parasites or ova.

Gastric analysis: No free HCl present, last two tubes bile tinged.

Phthalein, renal function tests: First hour 45 per cent., second hour 5 per cent., total 50 per cent.

x-Ray examination: Gastro-intestinal series showed spastic colon, spasm about pylorus.

Blood-culture negative.

Electrocardiogram shows severe myocardial damage.

Marrow puncture of tibia shows a fatty marrow almost entirely devoid of cells of any type.

Repeated tests for urobilin in the urine negative.

December 3d: Transfusion of 500 c.c. of citrated blood from son. Both donor and recipient belong to Group II.

December 9th: Examination of rectum by Dr. Hyman, Surgical Out-patient: "Small external and moderate internal hemorrhoids. Sigmoidoscope introduced to promontory of sacrum. Rectal wall normal as far as seen, nothing found to account for the anemia. The amount of bleeding from the rectum apparently not sufficient. The question of hemorrhoidectomy is secondary."

December 12th: Blood count, hemoglobin 50 per cent., R.B.C. 3,280,000, W.B.C. 7200, polymorphonuclear neutrophils 59, small mononuclears (lymphocytes) 23, large mononuclears 11, transitionals 4, eosinophils 3. The red cells show slight variation in size, shape, and staining characteristics. Some sickle forms noted; 2 normoblasts seen. Platelets increased (estimated). Has gained 7 pounds in weight and feels stronger.

December 18th: Blood count, hemoglobin 40 per cent., R.B.C. 2,810,000, W.B.C. 4600, polymorphonuclear neutrophils 63, small mononuclears (lymphocytes) 24, large mononuclears 9, transitionals 2, eosinophils 2; no normoblasts seen; slight change in size and shape.

December 22d: Discharged. Diagnosis: Mitral insufficiency, chronic myocarditis, hemorrhoids, secondary anemia severe. Patient re-entered the surgical service for removal of hemorrhoids.

January 13, 1922: Blood-count on this date showed hemoglobin 55 per cent. Red blood-cells 3,960,000, white blood-cells 5200, polymorphonuclears 61, small mononuclears 27, large mononuclears and transitionals 12. The red cells stain poorly. Poikylocytosis and anisocytosis. No large oval red cells, no normoblasts, marked central pallor present.

Patient was operated on for removal of his hemorrhoids and made a rapid and uneventful recovery. On September

2, 1922 patient reported for blood examination. In January, 1922 he weighed 190 pounds; on the date of reporting he weighed 170 pounds. He states that he feels well, has a good appetite, and has been able to do his work of blacksmithing. Blood-count: Hemoglobin 65 per cent, red cells 4,400,000.

Case II is of a different type, in that the blood-picture approaches a pernicious anemia in many respects. This patient is fifty years of age, single, female. The family history is interesting in that the father died of pulmonary tuberculsois at fifty-five; coresidence for six years. In 1917 a sister died with symptoms similar to the patient's present complaints—*i. e.*, pains in arms and shoulders, anemia, and weakness. Past history is unimportant from the standpoint of previous illness. She sustained an injury to the left hip in childhood, which resulted in shortening and permanent deformity. The orthopedic clinic diagnosed this condition an old tuberculous hip which had healed without drainage. At age of twenty patient weighed about 130 pounds; at present varies from 105 to 108 pounds. Menses ceased in 1917. No operations; habits unimportant; uses very little face powder, and that of a good grade, which does not contain lead as far as can be learned. The complaints are "grinding aches and pains in the left arm, left chest, and shoulder-blades." About 1916, one year before the death of her sister, who succumbed to symptoms similar to those of patient's, there was noted the onset of pain in the left elbow and left shoulder. The pain was not constant, was of a dull "grinding" character, worse at night. After the death of her sister (whom patient nursed) in 1917 these symptoms became more severe. She has a tight feeling in the left chest "as if being held in a vise." Gradually the pain about the elbow extended to the left shoulder, then within six months it gradually extended to the region of both scapulæ. She has complained of gradual onset of weakness. At present she tires very easily. Appetite and sleep are good. No abdominal pains, no sore mouth, no diarrhea. Injections of iron cacodylate make her feel better. In May, 1921 she stopped the injections for three

months, with a recurrence of symptoms. Felt better as soon as the iron cacodylate was resumed.

Physical examination reveals very little in the way of abnormal findings and does not throw much light on the etiology of her anemia. The mouth shows some pyorrhea, there are several crowned teeth, and several teeth have been extracted. Tonsils are negative, thyroid gland negative, lungs negative. Heart is not enlarged, the sounds are weak and rather distant. No murmurs heard. There is some tenderness in left lower quadrant of abdomen. She complains of pain here and at times about the umbilicus. No palpable masses, liver and spleen not felt. Extremities show considerable shortening of the left hip, with compensatory scoliosis of the spine. Neurologic examination is negative throughout, except some impairment in sense in position of limbs. Wassermann in the serum negative, both antigens. In March, 1922 a special investigation of the lungs was carried out by Dr. Mace in the chest clinic on account of the old tuberculous hip condition. The physical examination, *x*-ray of the chest, and sputum examination were negative. The blood-count on November 15, 1920 was hemoglobin 65 per cent., red cells 3,884,000, white cells 10,200. Differential: Polymorphonuclears 64 per cent., eosinophils 2 per cent., lymphocytes 30 per cent., transitionals 4 per cent. *x*-Rays of the teeth November 23, 1920 were negative for periapical abscesses. On January 3, 1921 the blood-count showed hemoglobin 75 per cent., red cells 3,352,000, white cells 8000, color-index over 1. She continued to receive injections of iron cacodylate for about two months and was improving in strength. For several months she was absent from the clinic altogether. In July, 1922 she returned. A gastric analysis at this time showed practically no free hydrochloric acid; there were, however, amounts of 10 at one and one-quarter hours and 8 at one and one-half hours. The ferments were present. Blood-count at this time showed hemoglobin 75 per cent., red cells 3,710,000, white cells 8400. Differential: P. M. N. 53, P. M. N. B. 1.5, P. M. N. E. 0.5, lymphocytes 40, large mononuclear and transitionals 5. The red cells show some variation in size and shape. No definite megalo-

cytes, no nucleated red cells, no fragmented cells. Roentgenologic examination of the gastro-intestinal tract is negative. For several months patient received injections of iron cacodylate alternating with intramuscular injection of whole blood. She failed, however, to show any improvement; the blood-count remains about the same with slight fluctuations. On January 19, 1923 the hemoglobin was 80, red cells 3,860,000, white cells 7600. Differential: P. M. N. 71, lymphocytes 28, P. M. N. basophils 1. The red cells show variation in size and some variation in shape. They are well stained, no definite megalocytes, no fragmented cells, no nucleated red cells. On January 23d a bone-marrow puncture was done on the left tibia. The marrow showed a few scattered cells mostly of the white cell series. Very little red cell proliferation, not an active marrow. On March 8, 1923 patient reported to the clinic complaining of a peculiar feeling of constriction in the throat. She feels weak, cannot walk properly, tendency to stagger. Slight numbness of the fingers of the left hand. Blood-count: Hemoglobin 75 per cent., red cells 3,240,000, white cells 6200. Differential: P. M. N. 61, lymphocytes 32, large mononuclear and transitionals 4, P. M. N. E. 1, P. M. N. B. 2. The red cells show some large oval forms, slight variation in size and shape. Reticulated red cells 1.5 per cent. No nucleated red cells seen.

Discussion.—Case I differs from Case II in that the patient presents certain etiologic factors as a cause of his anemia. There is a history of four definite attacks of so-called rheumatic fever. The last attack was seven months before admission to the hospital, and from the history one would infer an acute articular rheumatism. We are told that the temperature reached 105° F. and he was confined to bed for two months. We know that this type of infection is capable of causing a rapid and severe anemia, and superadded to twelve years of constant loss of blood, with a considerable rectal hemorrhage in 1918, we have factors that can well account not only for the anemia but also the marked depression and hypoplastic state of his bone-marrow. The questions which naturally confront us are, briefly: Will his bone-marrow regain its normal function or will he terminate

with a picture of a pernicious or an aplastic anemia? Will the achlorhydria disappear and normal gastric secretion return? It seems logical to assume that repeated insults to his bone-marrow over a number of years have so impaired its functioning power that future attacks of a severe infection, such as an acute articular rheumatism, might result in an aplastic anemia. Whether he will ever progress gradually downward to end as a pernicious anemia is an interesting speculation, but we can go no farther. It might be questioned as to whether his improvement while under treatment could not be taken as an index of probable complete recovery. Probably not, as he was seen eight months after discharge from the hospital and his blood was still below normal, and of special significance is his persisting low white blood-count. This is not a favorable sign.

Case II has been under observation for more than two years and we have not been able to discover a cause for her anemia. At first her teeth were under suspicion as a possible factor, and while it is stated in her history that pyorrhea is present, this was not confirmed by subsequent investigation, and roentgenograms of the teeth did not show pyorrhea or periapical abscesses. It was considered that both she and her sister, who died of an anemia, might have been using a face powder of fine impalpable lead, causing a lead anemia, but investigation showed that this was not the case; furthermore, the blood-picture and the clinical findings have never suggested chronic lead intoxication. The possibilities of a chronic hyperplastic tuberculosis of the cecum or a slowly growing carcinoma of the breast or gastro-intestinal tract have been investigated, with negative results. We are still looking for foci of infection. The one possibility that suggests itself, owing to the fact that the sister died of apparently the same type of progressive anemia, is that the patient has a congenitally hypoplastic marrow. This may seem like a fanciful idea, but it is nevertheless a real factor that is gaining more general recognition. With the appearance of numbness in the left hand, some unsteadiness of gait, markedly increasing weakness, and large oval red cells in the blood-smear it may be possible in the near future to place

this patient in the myelotoxic group of pernicious anemia. In this group the nervous system involvement is most marked, especially posterolateral sclerosis, the marrow is very sluggish, hemolysis is slight, remissions are not a feature, and progressive weakness is practically always present.

The next 3 cases fall more naturally into this myelotoxic group of pernicious anemia, although there was a long period of time in each case when diagnosis and classification was impossible. It will be of advantage here to pause for a brief interval and recapitulate some of the present views concerning pernicious anemia. It is a disease particularly of adult life, is idiopathic in nature, and therefore grouped by its clinical manifestations and not by any etiologic basis. The study directed toward the etiologic factor is massive, but as yet unproductive of the true cause. Possibly of the nature of a generalized toxemia due to altered lipoid metabolism, the disease presents an anemia which is but one expression of the systematic intoxication. The chronic hemolytic agent accounts for the clinical remissions and relapses by virtue of the ratio of blood regeneration to destruction. The hemolytic action on the circulating red blood-cells is directly responsible for the anemia, the deposits of hemosiderin in the liver, the abnormal amount of bilirubin in the plasma, and indirectly for the cellular red marrow of the long bones. This abnormal marrow reaction is a compensatory effort on the part of the hemopoietic tissue to supply the deficiency in red cells which has taken place in the peripheral circulation. The hyperplasia of the bone-marrow varies, therefore, with the activity of the unknown hemolytic agent. Pernicious anemia, then, is not a primary disease of the blood or blood-forming organs. Furthermore, the spleen and hemolymph-nodes are probably not primarily at fault, although abnormal splenic function is undoubtedly present. Focal infections, especially of the mouth, while not considered a primary cause, may be of importance in determining the course.

Many still refer to characteristic blood findings in pernicious anemia. There is no pathognomic blood-picture, the picture most commonly found is a general oval megalocytosis, a leuko-

plenia and diminution of blood-platelets. The hemoglobin content is comparatively high for each cell, therefore the color index is high. The blast crisis which occurs so often just before the clinical remissions changes the blood-picture so that megaloblasts, normoblasts, or other young forms of red cells are found in varying numbers in the peripheral blood. Oval megalocytes, however, are still present. The most valuable single bit of evidence of increased activity of the bone-marrow is an increased number of reticulated red cells. These vitally stained cells are especially important in that group of cases which progress slowly downward with slight remissions and a sluggish inactive bone-marrow. Having thus reviewed the blood findings commonly present in this disease, let us turn to the symptoms which are not caused by the anemia *per se*. Any or all of these symptoms may precede the anemia by years. Follow-up systems often bring us face to face with patients seen years previously whose complaint was a history of paroxysms of gastro-intestinal disturbance or indigestion, nausea or diarrhea, and who leave the hospital labelled achylia gastrica. Achlorhydria or achylia is present in the large majority of cases and may antedate the anemia by many years. Absence of free HCl is so constant that one hesitates to diagnose pernicious anemia if the case does not run true to rule. Periodic burning of the tongue or soreness of the mouth occur in 50 per cent. of the cases. This recurrent glossitis appears red and raw, and at times with superficial ulcerations. Atrophy commonly occurs later, and terminally the tongue appears smooth with the papillæ wasted. Such an atrophic glossitis may occur without the characteristic subjective symptoms. Occasionally the mucosa of the mouth may suffer the same change. Nervous symptoms are present in fully 90 per cent. of the cases if sought. The first symptoms are almost invariably some form of paresthesia, especially tingling and numbness of the hands and feet. Paresthesias in general are more common in older people.

Patchy sclerosis of the cord may progress into the postero-lateral sclerotic type. When degeneration is extensive enough sensory disturbances become recognizable. Almost invariably

disturbances referable to the posterior columns are first noticed. It is more common to have the anemia precede the combined sclerosis by a certain interval, although the reverse may occur. Thus all these cord symptoms may be a prominent feature when the anemia is relatively mild. Small retinal hemorrhages may be the only evidence of bleeding.

Symptoms of anemia *per se* need little mention. They are muscular weakness, dyspnea, palpitation, vertigo, fainting, edema, buzzing in the ears, etc., and are directly attributable to the deficiency of red corpuscles and blood volume.

Physically most true pernicious anemia cases look fairly well nourished, with a slight yellowish pallor. The tongue is smooth, as above noted, the spleen is ordinarily slightly enlarged, so that its tip is palpable and, depending on the degree of nervous system involvement, there occur objective sensory disturbances, especially referable to the posterior columns. (Vibratory sense, discrimination between points, discrimination between weights, and deep muscular sensibility.) True achylia is common, achlorhydria is almost constant, and urobilin in abnormal amounts is noted in both urine and stool. This last determination naturally varies according to the phase of remission or relapse.

With a clear-cut history of symptoms in conjunction with physical findings and a blood-picture considered the rule we do not hesitate in the diagnosis of pernicious anemia and its ultimate outcome. It is in those sluggish cases, those of the so-called myelotoxic type, that the greatest difficulty has arisen regarding a grouping into a true primary anemia type. The 3 following cases are presented in brief abstract, many of the unimportant details being omitted.

Case III.—G. S., aged fifty-two, male, Spanish. U. C. H. O. P. D. No. 83,926.

Patient came to the clinic with a complaint of weakness and dyspnea on exertion, a slight cough and low of weight. One brother died of tuberculosis in adult life, otherwise the family history is unimportant. Patient has always lived in California

and is a butcher by trade. Had the usual childhood diseases, pneumonia at twenty-seven and typhoid at thirty-one, the convalescence from which was much prolonged (one year). Denies any venereal sore. Habits are good. The present trouble started about two years ago, when he first noted periodic attacks of biliousness and loss of weight and strength. Succeeding this he was troubled with much dizziness. He consulted a physician, who told him he had a high blood-pressure. It was reduced by means of diet, but since that time he rapidly went down hill, losing weight and strength. Constipation became fairly marked, tingling and numbness became evident in the hands and feet, there was marked dyspnea on exertion, and the patient was forced to stop work. There is no history of improvement in the last year and in the last months the symptoms have progressed. Tongue has not been sore during the period of his illness. He has lost 30 pounds in weight in the last year.

Physically the patient is markedly pale, but of fair nutrition. The skin and mucous membranes show pallor, with a slightly yellowish tinge, more noticeable in the scleræ, the pupils react to light and in accommodation, backgrounds negative. Hearing is diminished in the right ear, but the tympanic membranes appear normal. Teeth in excellent condition, tongue is clean and not atrophied. Neck shows no adenopathy and the thyroid is not palpable. The chest is normal in contour. There is no moisture in the lungs, although the patient still complains of a persistent cough without much expectoration. The heart is not enlarged, sounds regular, no murmurs. Pulse is full, strong, regular rate 85, blood-pressure 155/90.

Abdomen symmetric, soft, no abnormal masses noted. The liver and spleen are not palpable. Rectal examination is negative. There is a slight edema of both lower extremities around the ankles. No changes noted in superficial sensation and deep muscle sense is apparently normal. The deep reflexes are sluggish, but equal. No pathologic reflexes noted.

Laboratory findings: Blood Wassermann negative. Urine showed a slight excess of urobilin, no albumin, sugar, or casts.

Phthalein, total 55 per cent. Ewald test-meal showed no free hydrochloric acid and a very low total acid.

Gastro-intestinal studies showed no abnormalities, and a roentgenogram of the lungs showed no evidence of pathology. Blood-count: R. B. C. 2,150,000, Hgb. 44 per cent., W. B. C. 14,300, 90 per cent. polymorphonuclears, 10 per cent. lymphocytes. The smear shows a general megalocytosis, with some polychromatophilia, occasional normoblasts, and no megaloblasts. Subsequent blood-count during the next three months always showed a white count over 10,000 and always a general oval megalocytosis with a low reticulated cell count. Four bone-marrow punctures were performed, two on each tibia. In none of the preparations was the tibial marrow found active. Stress was laid on evidence of total number of marrow cells, the predominant type of cell, and presence of mitotic figures. Our conclusions were that the tibia marrow was sluggish and was not responding to the degree of anemia present. The patient during the next two months went to the country. He evidently experienced a mild remission, for he felt some stronger, appetite returned, and the dyspnea was not severe.

He returned again to the clinic about five months after the primary examination in a mild relapse, with return of numbness, tingling, and loss of strength and sore tongue. The red cells were 3,400,000 and the white cells 6000, certainly a very large proportionate decrease in the white cell elements.

He returned again to the country, rapidly progressed downward, and died of marked anemia and nervous system involvement. This last information was obtained from the physician who treated him terminally. There was no autopsy performed.

Discussion.—This case represents a myelotoxic type of pernicious anemia which progressed rapidly to a fatal termination with but one mild remission noted. The persistent elevation of the white cell count is very unusual, especially with a high percentage of polynuclear cells. This discrepancy regarding the white marrow cells caused us to investigate the tibial marrow on four different occasions, but we were unable to come to a

logical conclusion through this procedure. We felt that if the marrow could respond to a call for white cells (possibly from an unrecognized infection), then, for the same reason, the marrow should be able to supply the diminution of red cells in the peripheral blood provided hemolysis was not excessive. We were much surprised to find an inactive fatty marrow in all our examinations. The specimens in no way simulated the red marrow we ordinarily find postmortem. We ventured a poor prognosis on the basis of a sluggish marrow and grouped this case in the myelotoxic class. Naturally we had no information as to the erythropoietic activity of the marrow of other long or flat bones.

Case IV.—R. G., aged sixty-seven, male. U. C. H. O. P. D. No. 13,518. First entered the clinic in 1915 with a complaint of diarrhea and loss of weight. Superficial physical examination was largely negative, and he was sent to the hospital for thorough investigation. There was nothing of importance in his family or past history save the fact that several years ago he had spent some time in the West Indies and in South America. Previous diseases were unimportant and any venereal trouble was eliminated. His habits were good save a little difficulty in sleeping recently. His chief complaint was attacks of morning diarrhea, which were recently accompanied by loss of 15 pounds in weight. The movements were always watery, with no trace of blood or mucus. There was no tenderness and little abdominal distress, save the griping pains immediately before stool. Physical examination for the most part was negative. The blood-count, blood Wassermann, urine, stool, and gastro-intestinal series did not aid in arriving at any positive conclusion. His blood-pressure was somewhat elevated, and a series of gastric analysis showed no free and a very small amount of total acid. He was discharged with a diagnosis of achylia gastrica. Patient re-entered hospital in 1922 with a complaint of weakness, progressive pallor, and dyspnea on exertion. On physical examination there was noted an icteric tinge to the scleræ, pale skin and mucous membranes, and several small hemorrhages in back-

ground of the right eye. The tongue was smooth, with papillary atrophy. The heart was slightly enlarged with a systolic murmur heard best in the fifth interspace at the left sternal border and transmitted widely over the precordia. Liver palpable, edge smooth and not tender. Spleen easily felt 2 cm. below the costal margin. The abdomen otherwise was negative. Extremities not remarkable, reflexes equal and active.

Laboratory tests: Urobilin slightly increased, albumin negative, sugar negative, no casts found. Fragility: Hemolysis began at 0.45 per cent., complete 0.32 per cent. NACl. W.B.C. 4400, with 65 per cent. neutrophils, 33 per cent. lymphocytes, 1 per cent. large mononuclear cells. The red cells showed marked megalocytosis with polychromasia. Occasional microcyte noted. Megoblasts 1 per cent., normoblasts 2 per cent., reticulated cells 7.6 per cent. A platelet count was not done. Coagulation time six and a half minutes in 15 mm. tube.

Bone-marrow puncture, right tibia. The number of marrow cells noted in the preparations were not in excess of normal. Few of the progenitors of the red cells seen. Stress was made upon a search for megaloblasts. Hemosiderin not stained for. The patient underwent a mild remission in the hospital. His weight and strength increased and his red blood-count rose to about 3,000,000 cells. We still have him under observation in the clinic and the anemia remained stationery for six months. It is problematic how long this condition will continue.

Discussion.—This case is one which at present would cause little confusion regarding the diagnosis. It represents a rather classical case of pernicious anemia which showed evidences of the disease years previously. This experience—achylia gastrica—as the first sign of pernicious anemia has been the experience of many. The same toxin affects many organs, some far in advance of others. Of these, it is well to remember the tongue posterolateral columns, or the gastro-intestinal tract may be involved before the anemia is manifest or the blood suspicious.

Case V.—M. L., aged thirty-eight, American. U. C. H. O. P. D. No. 73,003.

This patient first came to the clinic in 1921 with a complaint of dyspepsia, nervousness, and weakness.

The family history was essentially negative. The patient was born in Denver and resided there until twenty-two years of age, following plumbing as an occupation since the age of fourteen. He was never "leaded." Since the age of twenty-two has resided in San Francisco. He has been subject to gastrointestinal disturbances for many years. As long as fifteen years ago a physician told him he had no acid in the stomach. Has had pneumonia five times, but came through all attacks without sequelæ. Had gonorrhea three times and a primary sore followed by secondary manifestations at twenty. Took Hg. (rubs and blue mass) and K. I. for years. Was married at twenty-two. His wife has been under treatment for lues at the University Clinic. Recently the symptoms from the gastrointestinal tract have become aggravated and patient complains of much gas, burning of stomach not related to meals, and some vomiting. Bowels are inclined to be constipated. In addition, patient complains of burning and tingling of feet.

Physically the patient appears to have lost some weight, is somewhat pale and very nervous. The scleræ are not remarkable, no icteric tinge being noted. The eyes react to light and distance and the backgrounds are negative. The teeth are poorly kept, but the appearance of the tongue is normal. Neck shows a slight posterior chain adenopathy. The chest is well developed, but poorly clothed. The apex of the right lung is slightly dull with slight crepitations heard on inspiration and a somewhat distant type of breathing. The heart outline is not enlarged, sounds clear, regular, no murmurs. Pulses equal and synchronous, mild degree of sclerosis. Abdomen, liver, and spleen not felt. No abnormal tumor masses noted. No tenderness over the gall-bladder or appendical region. Rectal examination negative. Secretion of prostate not examined. Extremities are negative. Reflexes hyperactive. No pathologic reflexes noted. Neurologic examination negative.

Laboratory tests: Urine negative for sugar and albumin. No casts seen. Phthalein 55 per cent. in two hours. Stool:

No ova seen. Negative for occult blood. Blood Wassermann negative. Blood-count: R. B. C. 3,380,000, Hgb. 70 per cent., W. B. C. 6400, with 62 per cent. polymorphonuclear cells, 33 per cent. lymphocytes, and 5 per cent. large mononuclear cells. Smears, slight anisocytosis noted. Gastric analysis, no free HCl. Total 46 at one and three-quarter hours (highest reading).

x-Ray: Lung fields clear. Heart and arch O. K. Diaphragm moves equally and well. Gastro-intestinal tract negative.

This patient was followed through the clinic for about two years. During this interval of time many opportunities were offered to study his condition. The gastro-intestinal symptoms were always a prominent feature in his complaint. About a month before his death his tongue and esophagus became very sore, and the patient complained of burning from his mouth to the stomach. Asthenia was the most marked symptom for months before his termination. This condition was so pronounced that Addison's disease was considered a possibility. The blood-pressure dropped very markedly and the patient was absolutely bedridden. In September, 1922 he went for a hunting trip into the mountains, and the extreme exertion caused a collapse which forced him to his bed and precipitated his extreme asthenia. He responded to no medication, including three transfusions. During these months observations were frequently made upon the number and characteristics of the red cells. There was never a profound anemia, the count holding fairly constantly around 3,000,000 cells. We felt that large oval red cells became more prominent, however, as the intoxication became more marked.

Autopsy: Briefly stated, the postmortem findings were those of a somewhat atypical primary anemia. The mucous membrane of the stomach was atrophic, the liver showed no siderosis. The spleen was enlarged, no tuberculosis noted in the adrenal glands or lungs. The long bone-marrow of the femur was red, as is ordinarily found in typical pernicious anemia cases. The tibia marrow, on the other hand, was entirely fatty. There was no evidence found at autopsy to suggest latent or active syphilis.

Discussion.—We have presented this case because it is felt we were dealing with pernicious anemia of a rather unusual type. Our clinical diagnosis was pernicious anemia, but we felt that the toxemia primarily made itself evident in symptoms referable to the gastro-intestinal tract, and terminally as a general intoxication, the principal symptom of which was a profound asthenia. Abnormal blood findings were never in the foreground of the clinical picture. It is felt the necropsy findings substantiated our premise, for if the toxemia had been of a marked hemolytic nature, we would have expected erythropoietic response which is evidenced by red long bone-marrow. We therefore assume that the blood as such did not bear the brunt of the attack. Such a condition, we feel, is comparable to those cases of subacute combined degeneration which die from the nervous degeneration and not from the anemia itself.

We wish to thank Doctor William J. Kerr for permission to report 2 of these cases who were in the Medical Wards at the University of California Hospital.

CLINIC OF
DR. H. LISSER
DR. CHARLES E. NIXON

ENDOCRINE GLAND CLINIC, DEPARTMENT OF MEDICINE, UNIVERSITY OF CALIFORNIA HOSPITAL

DYSPITUITARISM AND EPILEPSY. A REPORT OF SIX CASES

INTRODUCTION

EPILEPSY has been ascribed to innumerable causes. It is now regarded as a syndrome due to various etiologic factors, but in many instances developing on a constitutional basis with infectious or toxic states, mental or emotional disturbances and glandular dyscrasias as predisposing or precipitating causes. We are excluding, of course, the group that is obviously symptomatic, as when due to a brain tumor or cerebral syphilis. In the cases where there is no apparent etiology apart from a neuropathic inheritance, the group that has been termed "idiopathic" or "essential epilepsy," it has been frequently suggested that metabolic or endocrine disturbances may play important rôles as causative factors. The tendency to implicate one or other of the ductless glands has had its latest development on the continent in the removal of one adrenal gland in an attempt to cure the disease. Most of the endocrine relationships that have been proposed are somewhat vague and fanciful. Several neurologists and psychiatrists—Clarke, Tucker, Timme, and others—have dwelt upon a pituitary etiology. The title of this paper is not intended by us to convey the thesis that the 6 cases of epilepsy herewith reported are due to pituitary disturbance; such a conclusion would be largely theoretic and difficult of acceptable scientific corroboration. Certain outspoken glandu-

lar signs and symptoms are, however, very evident in these patients, and it is our purpose to call attention to this aspect of their constitutional make-up. It is felt that this side of the picture should be recognized and properly estimated in planning their therapeusis. Organotherapy was, therefore, instituted in addition to the exhibition of luminal; excellent results as far as the epileptic seizures were concerned was obtained from the luminal, as was to be expected. In addition, however, very striking and satisfactory results were obtained from the glandular products, especially pituitary extracts. It is our purpose to emphasize the value and importance of such appropriate organotherapy.

REPORT OF CASES

(It is to be understood that complete histories, thorough physical examinations, and all necessary laboratory investigations were made in the cases herewith reported. For purposes of brevity only the essential and pertinent facts are recorded.)

Case I.—D. W. (private case of Dr. Lisser), aged ten years when first seen March, 1923.

Family History.—No nervous or mental disease; no epilepsy in family. Two older sisters well and bright. Mother's appearance suggests hypothyroidism.

Past History.—Fell and bumped back of head when one year old; was unconscious for a few minutes.

Present Illness.—In November, 1921, at the age of eight and a half years, the patient had her first convulsion; she was unconscious for one-half hour, and following this slept several hours. The second seizure occurred one week later. At that time Dr. Cowan, of Fresno, noted endocrine status. *x*-Ray plate showed a very small sella turcica (Fig. 200). For about a year the patient took a combination of thyroid and pituitary extracts by mouth in capsule form. No bromids or luminal were given. She had about ten attacks between November, 1921 and March, 1923, that is, in the past year and a quarter. She was entirely free from attacks from April to November, 1922.

Examination (March, 1923).—Unruly, surly, somewhat

stupid looking child, quite lacking in self-control, comprehension, and co-operation, indulging in "tantrums." Weight (light dress) 80 pounds. Height 52½ inches; span 52 inches; upper measurement (vertex to symphysis) 25 inches; lower measurement (symphysis to sole) 27½ inches. Thick saddle type of nose, though not typical as in cretinism or congenital

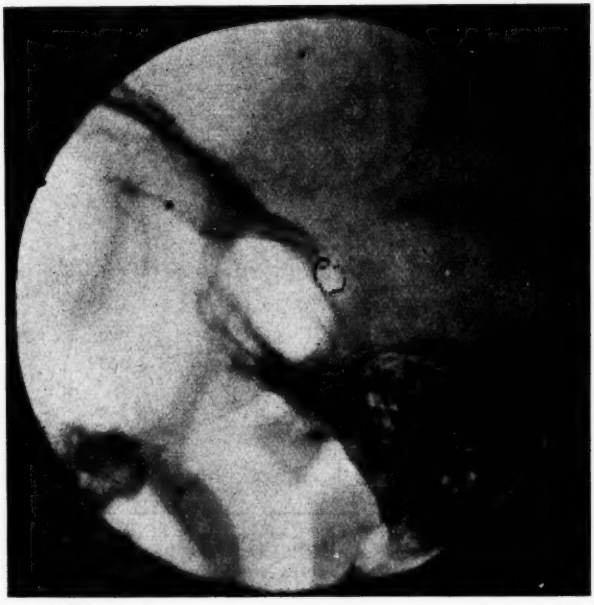

Fig. 200.—*x*-Ray of sella of Case I, aged eight and a half years. The sella is decidedly small.

lues. Tonsils are enlarged. Thyroid is definitely smaller than normal.

Blood-pressure 84/60.

Urine is normal.

x-Ray plate of skull March, 1923 (Fig. 201) shows a slight increase in the convolutional markings in the frontal region.

Sella is small and flat.

Posterior clinoids are somewhat indistinct.

Wassermann negative.

Wassermann of parents also negative.

Basal metabolism not attempted, as patient is too obstreperous. Mental test shows patient to be very flighty and unable to concentrate. The mental age is five years and three months; actual age ten years; intelligence quotient 44 per cent.

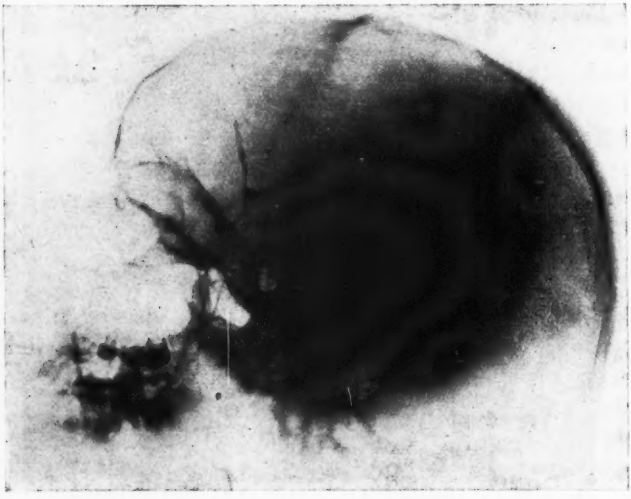

Fig. 201.—*x*-Ray of skull showing sella of Case I at ten years of age.

Summary.—Girl aged ten; grand mal epileptic seizures beginning at the age of eight and a half years; mental retardation; suggestive signs of hypothyroidism and hypopituitarism; very small sella and very small thyroid; improvement emotionally and mentally and decrease in frequency of epileptic seizures under treatment with thyroid and pituitary extract. No bromids or luminal given.

Case II (Figs. 202–205).—M. A., single, aged sixteen years. O. P. D. No. 85,469. First seen April 4, 1922 in Ductless Gland Clinic.

Family History.—No nervous or mental diseases; no migraine or epilepsy; no endocrine disturbance in family.

Past History.—No serious illness. Dilatation of the cervix at the age of twelve and a half years.

Menstruation began at the age of twelve; never regular; interval always six to seven weeks; always scanty; only two to three pads used during the three days of flow.

Fig. 202.—Case II before treatment. Weight 168 pounds, aged fourteen years. Note marked obesity.

Always constipated; big appetite the last three to four years. Is 61 inches tall. Weight one and a half years ago, at the age of fourteen, was 168 pounds. Weight for age and height should be 108 pounds. Reduced by omitting carbohydrates to 140 pounds (loss of 28 pounds) by April, 1922, when first seen by us.

Present Illness.—First seizures at the age of twelve years, coincident with onset of menstruation. At that time she had one attack a month; they became more frequent and severe.

Formerly they occurred at the menstrual period. The attacks are of the grand mal type. Six physicians have been consulted, and though they have tried various measures, including dilatation of the cervix, there has been no improvement.

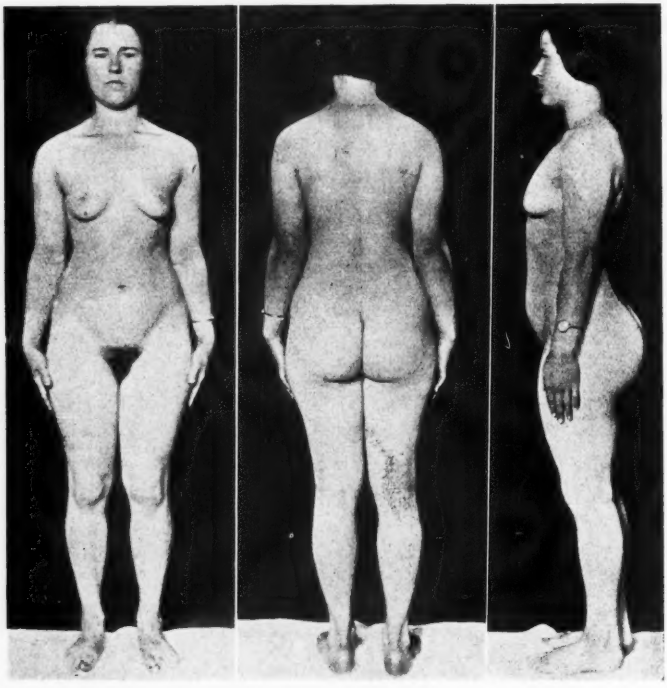

Fig. 203. Fig. 204. Fig. 205.

Fig. 203.—Same patient as in Fig. 202 after one year's treatment with whole gland pituitary extract. Note loss of 18½ pounds and striking change in figure.

Fig. 204.—Rear view of same patient as in Fig. 203.

Fig. 205.—Side view of same patient as in Figs. 203 and 204.

Blood and spinal fluid Wassermann were reported as negative. The patient had done well in her school work, being in the second year of high school at the age of fifteen. As attacks became more frequent there developed evident mental retarda-

tion, and a commercial course was interrupted by the present illness.

Examination.—The patient is obese, with a general fat distribution, not definitely of the girdle type. The skin is dry all over the body, especially on the shins. Thyroid is of normal size. The psychopathic examination shows considerable mental deterioration; she is indifferent emotionally; is not "shut in" or introspective.

Basal metabolism 8.3 per cent. plus.

x-Ray plate of the skull shows prominent convolutional markings in the frontal region. The posterior clinoids are tilted slightly backward.

Summary.—Markedly overweight girl of sixteen, with scanty menses at six weeks' intervals; epilepsy with dementia already advanced.

Treatment was started April 25, 1922, and consisted of luminal, gr. $1\frac{1}{2}$, morning and evening and whole gland pituitary (Armour), gr. 1, three times daily. The patient menstruated regularly thereafter May 14, June 16, July 16, August 17, September 16, October 16, November 17, December 16, 1922, and January 17, 1923.

Her weight April 25, 1922 was $141\frac{3}{4}$ pounds, and on February 20, 1923 it was 123 pounds, a loss of $18\frac{3}{4}$ pounds in ten months on pituitary extract alone with no thyroid given.

Mental examination made December 19, 1922 by the same examiner shows considerable improvement.

Mild epileptic attacks occurred April 1st, May 13th, June 4th, June 17th, September 20th, October 15th, January 17th. Previous to treatment severe attacks occurred at least once a month.

Result of treatment: Loss of $18\frac{3}{4}$ pounds; mental improvement, regulation of menstruation, fewer and milder epileptic attacks.

Case III (Fig. 206).—B. S. (O. P. D. No. 76,939), female, single; aged sixteen when first seen June 30, 1921.

Family History.—Negative for nervous, mental, or ductless gland disease.

Past History.—Patient was never seriously ill. When thirteen years old struck her head on sidewalk while skating, but was not unconscious and had no symptoms afterward.

Menstrual periods began at the age of fifteen; they were always irregular, but the intervals were never more than two

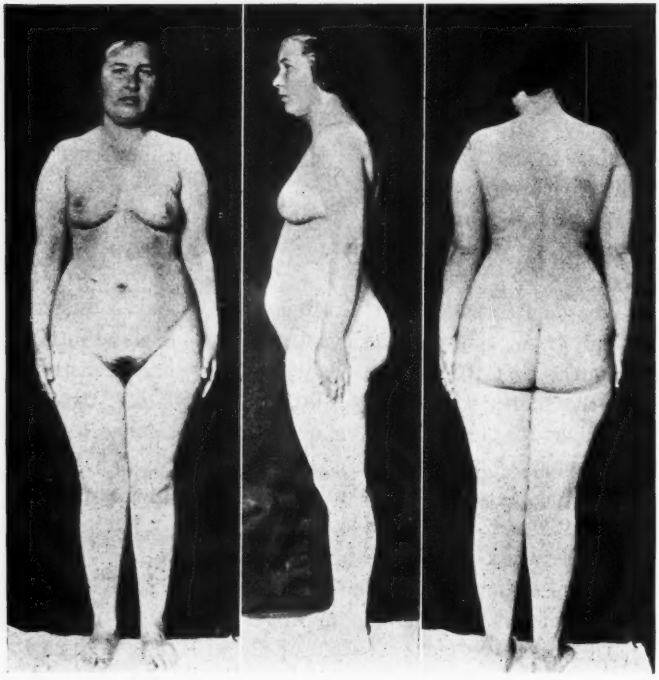

Fig. 206.—Photographs of Case III, aged seventeen years. Note general obesity of both thyroid and pituitary type, but principally the latter. Note small tapering fingers in lateral view.

months; the flow is scanty and lasts three days. Always inclined to be overweight, but at the age of ten there was a general increase in height and obesity.

Present Illness.—At the age of thirteen she began to have nocturnal epileptic attacks of the grand mal type; there was an interval of six months between the first and second attacks;

the intervals gradually shortened until the age of fifteen, when she had an average of two attacks a week; at the time we saw her the attacks were occurring weekly.

Examination at this time was as follows: Patient is flabby, phlegmatic type; quite obese for her age and height. Greatest weight is present one, 134¼ pounds. Height is 59¼ inches. Span, 57¾ inches. Upper measurement is 30½ inches and lower is 28¾ inches. Hair is fine, straight, and somewhat oily. Eyebrows are somewhat scant laterally, otherwise hair distribution is normal. Skin is of soft texture, but rather dry. The fingers are small, short, and tapering. Pads of fat, especially on cheeks and under chin. Definite pectoral fat pads, but no cervical fat pads. Typical girdle obesity.

x-Ray plate of skull was normal. Blood-pressure 108/86.

Summary.—Always stout; menses not appearing until fifteen and always delayed and scanty; epilepsy since the age of thirteen years, lately having one attack a week; akromikria; pituitary and thyroid obesity; hypopituitary proportions; upper measurement greater than lower; height greater than span.

Treatment and Course.—The patient has been taking luminal, grains 1–1½, and whole gland pituitary (Armour), grains 2–6, daily for the past fourteen months; in addition she has received 3 grains of thyroid (B. & W.) daily for the past eight months.

Since the beginning of this treatment she has had only ten epileptic attacks, the last one a very light one, two months ago, and the menstrual periods have occurred regularly at twenty-eight-day intervals, with a normal flow of four days. Despite the administration of thyroid and pituitary, her weight has increased from 138 to 147 pounds. A basal metabolic rate taken nine months after starting this treatment gave a reading of 21 per cent. minus, showing that the above dosage was inadequate.

Now, at the age of seventeen, the patient is in third year of high school and doing good work; the memory impairment, which was very definite, is no longer noticeable. The mother states that the patient seems like a different girl and her expression is certainly indicative of a more alert personality.

Case IV—A. L. (O. P. D. No. 83,662), female, single, aged eighteen when first seen February 3, 1922.

Family History.—Negative for nervous, mental, or ductless gland diseases.

Past History.—Patient was never seriously ill. Menstrual periods began at the age of thirteen years and have always been irregular; four years ago there was amenorrhea for seven months; she never menstruates oftener than once in two months. Sometimes the flow is very scanty, lasting one or two days; at other times it is more profuse and occasionally lasts eight days.

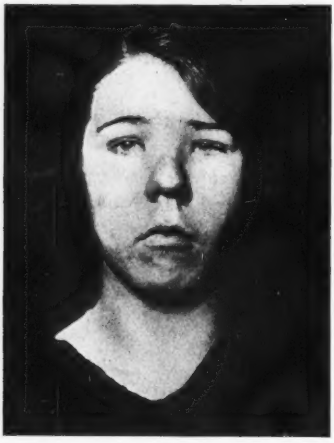

Fig. 207.—Case IV, aged eighteen years. Note thick end of nose, puffy upper lids, heavy, massive features suggesting acromegaly.

She reached her present physical development at fifteen years.

Present Illness.—At the age of seventeen years she fell on the back of her head while dancing; she was unconscious for forty-five minutes, and following this had dizziness and headaches. The headaches continued up to six months ago. The patient was seen ten months after the accident, and up to this time had had "fainting spells" usually once a week, but sometimes as many as three a day. In these attacks she falls and

loses consciousness for about a minute. She has become irritable and nervous.

Examination.—Her weight is 180 pounds. Height is 68½ inches; the span is 68½ inches; upper measurement is 35 and the lower is 33½ inches. The skin is somewhat dry and slightly rough. Features are coarse and heavy, suggestive of acromegaly (Figs. 207, 208). Thyroid is about twice normal size, symmetrically enlarged, no nodules and no thrill or bruit. Vision is 20/60 in the right eye and 20/200 in the left eye. On ophthal-

Fig. 208.—Lateral view of Case IV. Note heavy supra-orbital ridges and thick protruding upper lip.

moscopic examination there was a question of an early optic neuritis. The visual fields before and after treatment are shown in Figs. 209, 210.

x-Ray of the skull (Fig. 211) showed a sella of normal size and open. Rather prominent convolutional markings in the frontal region. Heavy supra-orbital ridges and occipital protuberance. Large sinuses. Prognathism. Conclusion: Acromegalic changes.

Basal metabolism 15 per cent. plus.

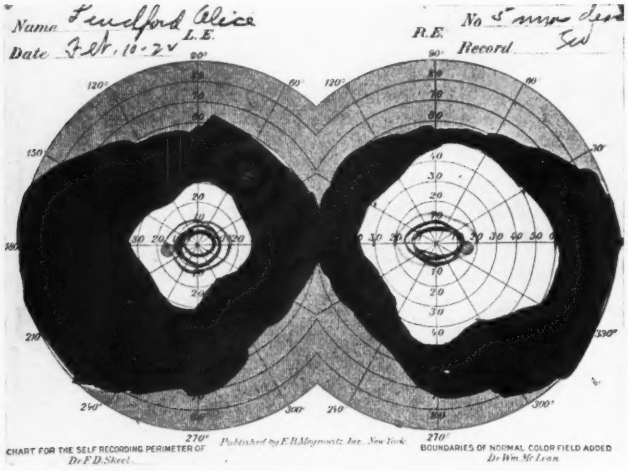

Fig. 209.—Visual fields of Case IV, the acromegalic, before treatment, February, 1922, showing concentric contraction of the visual fields.

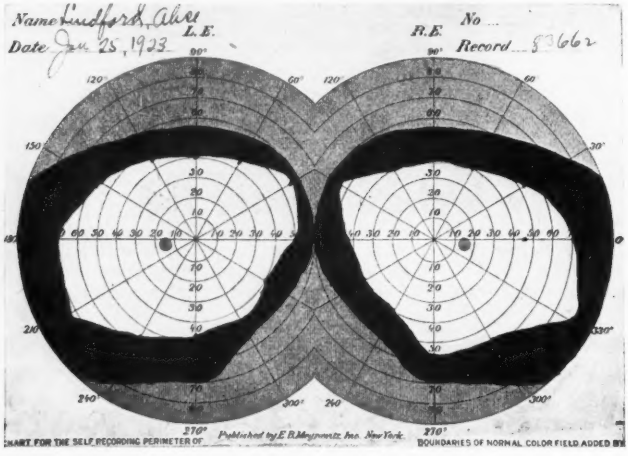

Fig. 210.—Visual fields of Case IV one year after beginning treatment, January, 1923.

Blood Wassermann negative.
Blood-pressure 130/80.

Summary.—Dizziness, inability to concentrate, headache, irritability, nervousness, petit mal attacks, and contraction of visual fields; enlarged thyroid; acromegalic facies; acromegalic *x*-ray plate of skull. Menstrual interval two months.

Treatment and Course.—For the past thirteen months the patient has been taking from 15 to 30 grains of ovarian substance (Armour) a day.

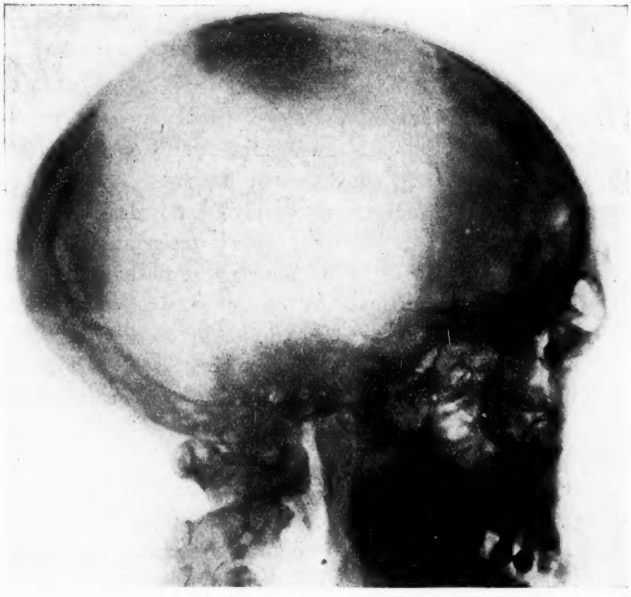

Fig. 211.—*x*-Ray of skull of Case IV. Note heavy supra-orbital ridges, occipital protuberance, large sinuses, and prognathism.

During these thirteen months she was not given pituitary extract because of her tendency to acromegaly. She has had eleven attacks, but in the past eight months has had only one attack. The first month after treatment was started there was a thirty-eight-day interval between menstrual periods; the second month there was a twenty-nine-day interval; the third month there was a thirty-eight-day interval; the fourth month,

a thirty-three-day interval, and since then the periods have occurred about every thirty days, whereas before the treatment they occurred only every sixty days. The periods have lasted from three to five days and the flow has been fairly copious.

Case V.—H. H. (private case of Dr. Lisser), single female, aged twenty-two when first seen August, 1921.

Family History.—No mental or nervous diseases. Father is stout. Mother's parents were stout. Patient's brother is obese.

Past History.—At the age of sixteen years had a fall on end of spine. Tonsillectomy at the age of twenty.

Menstruation began at the age of twelve years and was regular until seventeen; since then it has been very irregular, often two weeks late; never early; lately the flow has been scant.

Always constipated. She has always been stout. At the age of seventeen lost 20 to 40 pounds (exophthalmic goiter), but gradually regained this. At the age of twenty she weighed 196 pounds, but then reduced 20 pounds by diet.

At the age of seventeen she had a nervous breakdown and was in bed eight weeks; the symptoms were those of exophthalmic goiter, namely, tachycardia, goiter, nervousness, tremor, loss of weight.

Hair has grown on upper lip and under chin in the past year.

Present Illness.—The first epileptic attack occurred in March, 1920; she was unconscious for a long time, passed urine and bit tongue. She had attacks in May, November, December, of 1920, and in May, 1921, the last attack being due to the omission of luminal for four days. When she was in grammar school she was very bright, being first in the class, but did not learn so well in high school, and became dull mentally after the onset of the epileptic seizures. Has been dizzy since March, 1920; never before.

Examination (August, 1921).—Patient is generally obese, but the fat is chiefly heaped on the hips and abdomen. Skin is thick, but not rough. Hair is dry, heavy eyebrows, considerable growth on upper lip, chin and neck; masculine type of

pubic hair distribution and excessive hair on arms and legs. The thyroid is slightly enlarged, but there are no signs of hyperthyroidism. Hands are akromikria. Visual fields are normal. Urine is normal.

Blood-pressure 108/88.

x-Ray plate of skull is negative.

Basal metabolism is 3.3 per cent. minus.

Blood Wassermann is negative.

Summary.—Single girl aged twenty-two years; five grand mal seizures since age of twenty, mental deterioration, family history of obesity, patient very obese, scanty menses often two weeks late, attack of exophthalmic goiter at seventeen years, masculine type of hair distribution, akromikria.

Treatment.—Luminal, 2 grains daily, was administered. Whole gland pituitary extract, 3 to 6 grains, was given daily for six months, with loss of 19 pounds, loss of 6 inches around breast, 8 inches around abdomen, and 4 inches around hips. Later ovarian substance was added, later still thyroid, and finally the following formula settled upon: Anterior pituitary, gr. iij; ovarian substance, gr. iij; thyroid, gr. j, the above given in a salol-coated capsule three times daily.

No epileptic seizures have occurred since May, 1921 to date (March, 1923).

Menstruation is still occasionally three to five days late, but no longer two weeks late, and the flow is more copious.

She is back at work, and her brother, who is a physician, gives the following note of improvement in the patient's physical and mental state:

"The marked improvement in my sister's condition after pituitary gland therapy has been a revelation to myself and my family.

"After the onset of her symptoms she became mentally dull, apathetic, depressed, ambitionless, avoided company, and was continually complaining and daily developed new symptoms.

"At the present time she is holding a responsible position to the satisfaction of her employers and is studying to fit herself for something better. She assumes responsibility for family

matters, enjoys parties and dancing, and is the first to try to buoy up the spirits of anyone in the family that becomes depressed. There is a marked improvement in her menstrual irregularities. Her general build (fat distribution), which formerly was fairly typical of hypopituitarism, has changed, and at the present time she has a more normal contour.

"The epileptic seizures have been controlled by luminal, 2 grains daily."

Case VI.—S. W. (O. P. D. No. 88,742) female, married, aged thirty when first seen April 10, 1922.

Family history negative.

Past History.—Patient has never been seriously ill.

Present Illness.—She was well until the age of twenty-five, when she began to have decreased menstruation; previously she had had profuse flow for five or six days. Shortly after she began to have hot flashes and to gain in weight. At the age of twenty-eight she commenced with epileptic attacks at the menstrual period. Attacks are of the grand mal type. The attacks have become more frequent, and at the time of the examination was having from ten to twelve seizures a day just before or just after the menstrual period. She is very depressed while having the attacks and has become very nervous. She will also have diarrhea several days at this time.

Examination.—her weight is 145 pounds now, and six months ago it was 130 pounds. The skin is slightly thick, inelastic, and dry. The hair is dry. The outer eyebrows are scanty. She shows a girdle adiposity. Height 61 inches; span 60 inches; upper measurement 30 inches; lower measurement 31 inches.

Blood Wassermann negative.

The *x*-ray plate of the skull shows a roofed over sella turcica.

Blood-pressure 135/100.

Summary.—Obese woman with girdle adiposity, about thirty years of age, with marked lordosis and protuberent abdomen. Dry hair and dry skin. Scant menses; numerous convulsive seizures in relation to the menstrual period. Mild mental confusion.

Treatment.—Patient has been taking luminal and bromids for over a year, without definite improvement. Six weeks ago she was given whole gland pituitary (Armour), 2 grains, three times daily in addition to the luminal. This gland therapy has been too recent to report any results.

CONSIDERATION OF THE ENDOCRINE ASPECTS OF ABOVE CASES

It would be beyond the confines of this paper to present in detail the hormonic signs and symptoms in diseases of the hypophysis, thyroid, and ovaries, the three glands involved primarily or secondarily in the patients reported above. Acromegalic changes were noted in one case both in facies and *x*-ray plate of skull. Changes in the visual fields were noted in this patient. A small, flat, roofed-in sella was striking in Case I. The sella in the other 5 cases was probably within normal limits. In view of more recent roentgenologic investigations showing wide variations in the sella turcica in normal children and adults we are not inclined to attach much importance to the so-called "roofed-in" sella.

Obesity was quite marked in all the patients except the acromegalic. This obesity was mainly girdle in type, a point emphasized by Engelbach as pathognomonic of hypopituitarism; the obesity of the cervical region and extremities is considered likely of hypothyroid origin.

Menstrual disturbances, more particularly scanty flow and abnormally prolonged interval, is one of the most prominent features of pituitary disease. Five of the 6 patients reported had reached or passed puberty, and all of them presented this characteristic menstrual disturbance.

Changes in hair distribution of heterosexual type is frequently noted in pituitary disease. One patient presented this abnormality quite markedly. Dryness and coarseness of the hair is characteristic of hypothyroidism and sometimes noted in hypopituitarism; this was noted in all 6 cases. The skin is altered in texture in thyroid and pituitary disease, being dry, thick, and rough in thyroid insufficiency, and velvety, smooth, cold, and waxy in lack of pituitary function. All 6

cases showed more or less deviation from the normal skin texture.

The basal metabolic rate was determined in 4 of the cases; in 2 with marked hypopituitarism it was normal. In the acromegalic it was 15 per cent., plus; there was no hyperthyroidism to account for this, and it can be fairly interpreted as due to excessive pituitary function. Case III gave a rate of 21 per cent. minus; this determination was made several months after thyroid and pituitary extract was instituted and would indicate a pronounced thyroid insufficiency which had not been sufficiently supplemented by the dosage given up to that time.

Apart from the hormonic changes just described, which are unquestionably attributable to endocrine disturbance, mention might be made of certain striking mental phenomena manifest in these patients. In all except one mental retardation or deterioration was fairly marked; memory impairment was especially striking. Emotional disturbances were noted in all patients. There was a history of irritability, unstable emotions, and lack of interest. The mental retardation and emotional disturbances noted in these patients are such as are seen not infrequently in endocrine disease quite apart from epilepsy.

To recapitulate, all 6 patients showed obvious evidence of dyspituitarism, the thyroid and ovarian features seeming secondary to the primary pituitary dysfunction. This opinion is partly based on the physical changes recorded and partly on the remarkable response to pituitary substitution therapy.

RESPONSE TO TREATMENT

Two of the patients did not receive luminal. The acromegalic was given ovarian substance and the ten-year-old child received a combination of thyroid and whole gland pituitary extract. As it happens both of these patients had fewer epileptic seizures than prior to receiving glandular medication despite the fact that no sedatives were administered; this may have been accidental. The 4 patients receiving luminal either had no further epileptic seizures or much milder ones and at much longer intervals. We do not recommend at present

treatment confined to organotherapy alone, but consider luminal important in the treatment of most epileptic patients.

The 4 patients receiving luminal also received whole gland pituitary extract administered orally either in tablet form or in salol-coated capsules. The response to this treatment was quite remarkable and evidenced itself in two respects particularly. The effect to which we wish to call special attention was that obtained on the menstrual function. The intervals between periods had been six weeks to two months prior to treatment. This interval was promptly reduced to twenty-eight days or, at most, two or three days over. This regularity was maintained steadily in 3 patients over a period of a year to a year and a half, that is, since the time they came under observation a truly specific effect.

Two patients showed a marked reduction of weight under pituitary therapy alone, no thyroid extract being given. It is commonly stated that pituitary extract does not possess this weight-reducing power, at least not when given orally. The results in these 2 cases are so striking, however, that such a viewpoint is not tenable. One patient lost 13¾ pounds in ten months, and the other 19 pounds in six months; the latter lost in circumference 6 inches around the bust, 8 inches around the abdomen, and 4 inches around the hips from pituitary extract alone.

In 3 cases certainly there has been notable improvement in the mental and emotional status; the facial expressions in these patients evidenced a decidedly greater alertness than shown at the beginning of the treatment. In 2 patients the mothers recently volunteered the statement that the girls are brighter, happier, and altogether more normal. The brother, a physician, of the third patient volunteers the statement that his sister is enormously altered for the better emotionally. Two of the patients have demonstrated considerable progress in school work, and one has been able to resume office work with first-rate efficiency. We are not claiming that this mental and emotional improvement is due entirely to the gland therapy administered, but from a rather large experience of one of us with epi-

leptics we are inclined to the view that the improvement in the group of cases reported is rather more striking than is the rule in those epileptics treated with luminal alone.

CONCLUSIONS

1. Six cases of dyspituitarism and epilepsy are herewith recorded, 2 from private practice and 4 from the ductless gland clinic of the University of California.

2. These patients presented marked evidence of ductless gland disturbance, primarily pituitary disease.

3. Organotherapy was administered to all of them, 4 of them for a period of one to one and a half years, with strikingly beneficial results on the menstrual disturbances, obesity, and mental and emotional status.

4. In the 5 patients who were under treatment for a long enough period of time epileptic seizures either ceased entirely or became far less frequent and much milder. Two of these 5 patients did not receive either luminal or bromids.

5. We feel it important for the future of these patients to apprehend endocrine abnormalities when they exist, and to make a determined effort to correct them. We do not mean to suggest that all cases of epilepsy not due to brain tumor or syphilis are due to, or associated with, endocrinopathies.

6. An absolute essential in all gland therapy is patience; no results can be expected from haphazard treatment over a period of a few weeks. Treatment should be continued over many months and even years.

CLINIC OF DR. LEROY H. BRIGGS

SAN FRANCISCO HOSPITAL, UNIVERSITY OF CALIFORNIA SERVICE

FEVER AS A SYMPTOM OF VISCERAL CANCER

WE have for demonstration today the temperature charts of 3 patients, 2 of whom died in the hospital and came to autopsy. Each of these patients suffered from and died of a proved malignant growth uncomplicated by other diseases as far as it is possible to say. They have been selected from a series of 250 cancer cases seen in the wards over the past five years which have been studied to determine the frequency of a rise in body temperature with malignant disease.

Fever in malignancy has been recognized since Wunderlich in 1857 described an intermittent type and felt it occurred in rapidly progressing growths. Although much was written about it in the eighties, it almost has been forgotten as a comparatively frequent symptom of visceral cancer, for, unfortunately, like many other well-known bedside observations, it has been driven into the background by the more modern short-cuts to diagnosis afforded by laboratory, fluoroscope, and exploratory laparotomy. That fever with tumors offered difficulties to the clinician of a generation ago may be seen from the experience of James Finlayson, who in 1888, on writing of the "occurrence of pyrexia and shiverings in malignant disease," described several instances where fever and chills associated with a bulging abdominal mass prompted the exploration of a solid tumor instead of the expected abscess. However, as one progresses with the literature, less and less attention is paid this symptom, until in two of the most recent and popular systems of medicine no mention whatever is made of fever as occurring with cancer of the stomach. It has seemed fit, therefore, to take these 3 instances from the

series, exhibit their fever curves, and briefly describe their clinical courses.

Case I. Carcinoma of the Stomach.—E. L., a laborer fifty-nine years of age, whose past and family history were of no bearing, entered the hospital April 19, 1921, complaining of malaise, weakness, and the loss of 25 pounds in the past four months, together with constant upper abdominal pain of several weeks' duration, unaccompanied by nausea or vomiting. This pain was indefinite in character and apparently unaffected by food. Examination showed a very pale man weighing 137 pounds. The head, neck, and lungs were negative. The heart was slightly enlarged both to left and right, and a soft systolic murmur, not transmitted, was heard at the apex. The upper abdomen showed a slight bulging, and a large movable tender mass was felt in the midepigastrium, descending with inspiration. The liver was enlarged downward 3 cm. in the nipple line, but smooth, and the spleen was not felt. A small nodule was palpable in the rectum. The stomach contents showed an absence of free HCl with the total acid rising to 40 at the end of one hour, with lactic acid, occult blood, and Boas-Oppler bacilli all present. There was a marked anemia with 30 per cent. hemoglobin and 2.5 million reds that showed very little evidence of regeneration. Leukocytes were not noteworthy and blood-cultures and Wassermann were negative. On fluoroscopy a large defect of antrum and pylorus was seen, with a one-third six-hour residue. A month after entrance vomiting commenced and he had a nearly complete six-hour residue. On this account operation was performed on May 20th by Dr. H. S. Thomson in the hope of doing a palliative gastro-enterostomy, but a diffuse carcinomatous infiltration of the stomach was found so extensive that this could not be accomplished. On June 6th he was discharged as an incurable case to the Relief Home, where he died with complete pyloric stenosis on July 21, 1921. Unfortunately, no records of his fever while there are obtainable.

During the first two and a half weeks of his hospital residence

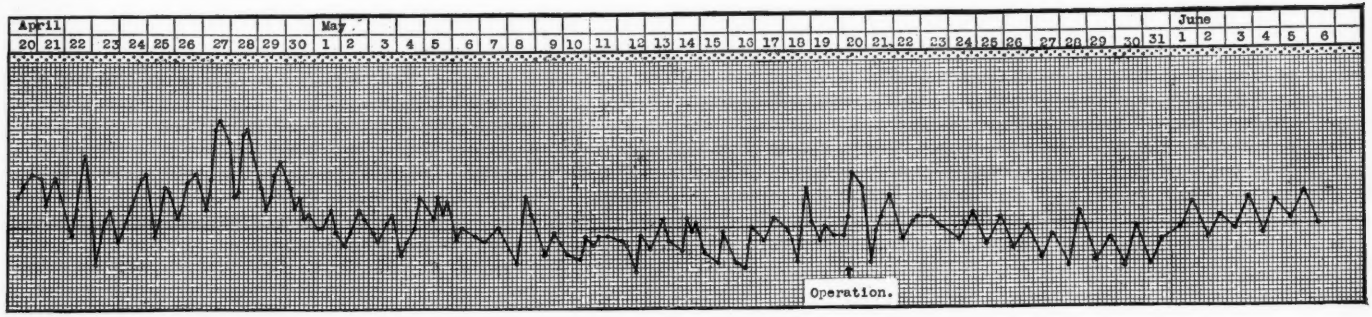

Fig. 212.—Temperature chart of Case I: Carcinoma of stomach.

the fever was irregular, fairly high, and exhibited a diurnal variation of from 1° to 5° F. (Fig. 212). In this period nothing could be found clinically other than the stomach growth to account for this. Then followed a three weeks' interval of normal temperature except for two isolated rises and the ordinary febrile reaction following operation. At the time of his discharge the fever had started to rise again. In this case without the benefit of postmortem examination it cannot be said with certainty that there was no other cause existent for the fever, although, as far as clinical observation and exploratory operation go, this would seem to be the case. From the occult blood in the stomach contents a certain amount of ulceration in the growth undoubtedly had occurred.

Case II. Carcinoma of the Bronchus.—P. D., a Philippino farm worker of thirty-three, speaking little English, entered the hospital August 3, 1921 on the chest service of Dr. Esther Rosencrantz. Except for the fact that both parents had died of tuberculosis twenty years before, his history was entirely negative, and he had enjoyed good health until two months previous, when he developed cough and fever. Examination at entrance showed a thin, sick-looking man weighing 100 pounds. The right chest was almost immobile, shrunken at the top and prominent at the base. With the exception of clubbed fingers the only physical findings during his five months' stay in the hospital were moderate but increasing signs of consolidation in the right upper lung. Fluoroscopies of his chest showed a slight pneumohydrothorax of the right side, with later a dense shadow involving the right lung. The blood Wassermann was double plus and for a time he was on mercury rubs, with little effect except to cause salivation. A great many sputum examinations, both by staining and by guinea-pig inoculations, were negative for tubercle bacilli, and he was considered a non-tuberculous case by Dr. Rosencrantz. His course was steadily downward and characterized by an ever-increasing degree of dyspnea and moderate cachexia. There were several small hemoptyses and he died a death of suffocation on January 3,

1922. Autopsy showed a primary occluding carcinoma of the right bronchus with extension into the right upper lobe, together with a purulent bronchiectasis and fibrosis of the entire right lung.

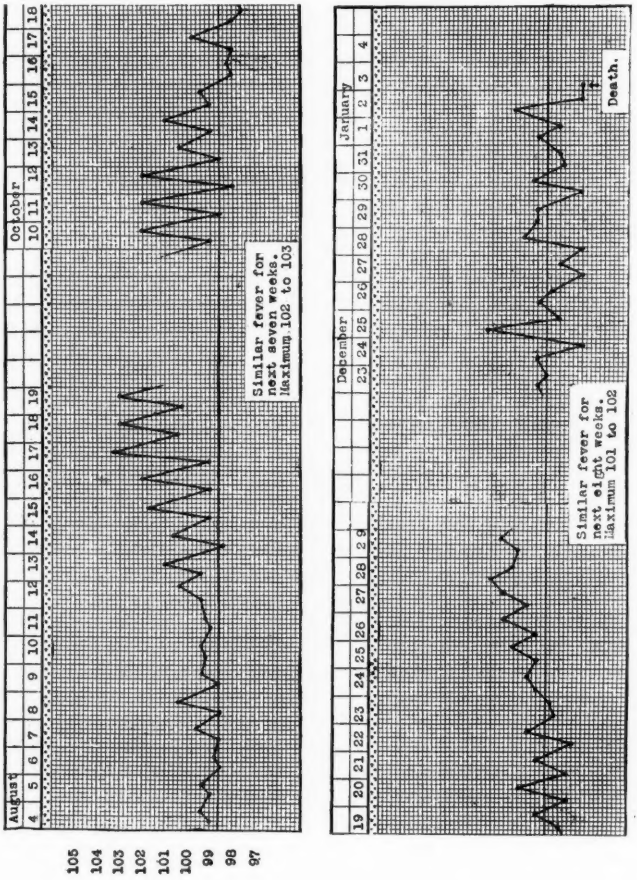

Fig. 213.—Portion of temperature chart of Case II: Carcinoma of bronchus.

Portions of the fever chart are shown in Fig. 213. Owing to its length the whole curve cannot be reproduced, but the intervals omitted are almost identical with those immediately preceding.

For the first ten days fever was slight, but for the next nine weeks it was definitely hectic in type, with an afternoon rise to between 101° and 103° F., and morning readings of between 99° and 100° F., only reaching normal on six occasions in that time. There were no noteworthy chills or sweats. Following this, and until he died, came a less regular type of fever with the daily excursions not so marked and approaching the low-grade continuous variety. For the last two weeks of life the temperature was largely subnormal. At no time during the whole five months was he fever free for more than forty-eight hours. The amount of pus in the bronchial tubes of the right lung was not thought sufficient to give the extensive fever found here, and with the proved absence of any other cause we must consider this a case of true carcinomatous pyrexia. There was a most striking resemblance to tuberculosis not only in the fever curve, but in the whole picture, and it was only after many negative examinations for tubercle bacilli, together with the unilateral character of the constantly progressing lesion, that this diagnosis was abandoned.

Case III. Carcinoma of the Stomach with Ulceration.—H. E., a gardener of sixty-one, entered the hospital September 6, 1921 complaining of pain and tenderness in the epigastrium. There was nothing of any importance in the family and past history. His complaint dated back six months before to a fall, in which he thought some lower ribs on the right side were broken. There was considerable pain with this, which later gradually merged into epigastric pain. Loss of strength and weight were progressive, and he fell from 165 to 131 pounds. Examination showed a rather pale man who looked ill. Physical findings were questionable pleural friction at the site of the supposed broken ribs, together with stiffened recti muscles and a possible epigastric mass beneath. Stomach contents gave no free HCl and a total acid going to 20, with macroscopic blood and Boas-Oppler bacilli. There was a moderate anemia which increased progressively down to 2.5 million. Blood-cultures and Wassermann were negative. Fluoroscopy demonstrated a large irregular

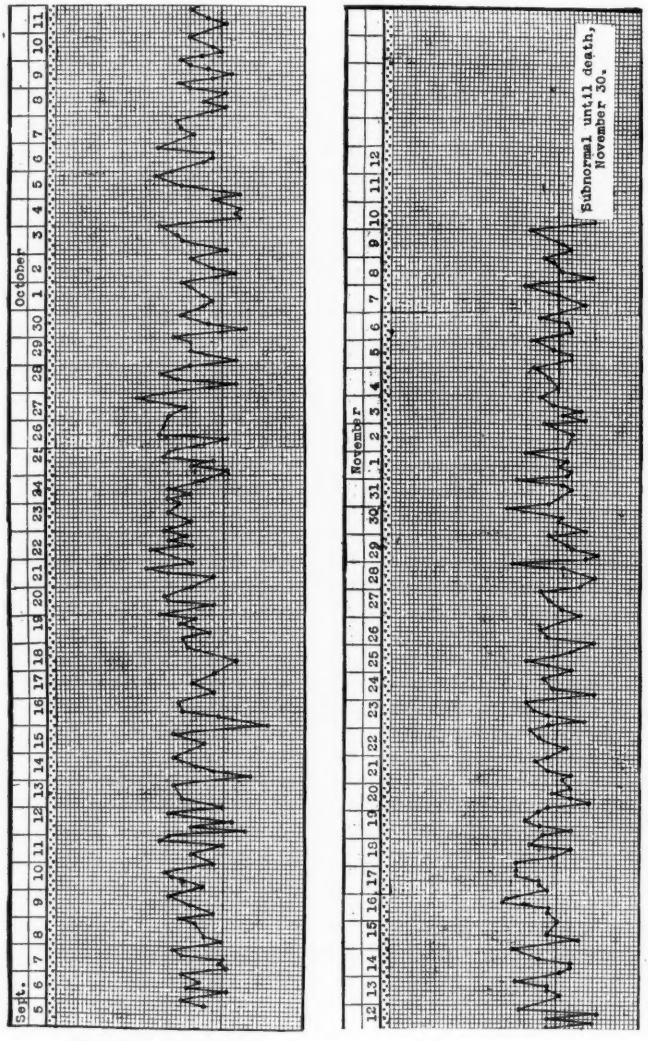

Fig. 214.—Portion of temperature chart of Case III: Ulcerating carcinoma of stomach

filling defect over the lesser curvature of the stomach. A diagnosis of gastric carcinoma was made, but nothing else was ever found to explain the fever. A few subcrepitant râles were present on and off at the lung bases behind, but the chest was negative radiologically. The progress of the disease was steadily downward and the patient died without event on December 1st. Autopsy showed an extensive ulcerating carcinoma of the stomach involving the anterior wall with direct extension into the left lobe of the liver, with gangrene of the latter, together with metastases into neighboring lymphatics and the right lobe of the liver. There was a subacute peritonitis in the upper left quadrant of the abdomen and a recent fibrin deposit in the pericardium. Streptococcus viridans was cultivated from the heart's blood and the spleen and was considered a terminal invader.

The fever curve was striking. Running an irregular septic course during the first two months of his hospital residence, it gradually fell, until for the last two weeks it was constantly subnormal. This fact is of significance in justification of the assumption that the fever was due to the growth itself, and not the secondary infections in peritoneum and pericardium. From the postmortem appearance of these two cavities it was certain that the invasion here had only occurred a short time before, and blood-cultures taken during the earlier weeks of his illness were negative. As there was extensive ulceration of the growth itself, probably this in large measure accounted for the fever.

These 3 cases are examples of carcinoma where the accompanying fever assumed the dignity of a major sign and symptom of the disease. Although such instances were infrequent in the series studied, they are deemed important enough to warrant their presentation in some detail at this time to recall to our minds that fever is still a symptom of visceral cancer.

CLINIC OF DR. RICHARD W. HARVEY

UNIVERSITY OF CALIFORNIA HOSPITAL, DEPARTMENT OF NEUROLOGY

GLIOMA OF THE SPINAL CORD

THE case to be discussed today is that of an American male, fifty-eight years of age, who complained of progressive weakness and urinary retention for the past six weeks. He had been catheterizing himself for the past four or five weeks.

Family history negative for nervous and mental diseases.

Past History.—Patient was born in Minnesota. Had been in Minnesota, Washington, Montana, and in California the last two years. Had worked as a laborer, a coal-miner, and bartender.

Past Illness.—No childhood diseases. Typhoid pneumonia at age of fifteen or sixteen. No other illness until the present. Venereal disease denied.

Habits.—Formerly 20 to 25 beers a day, smoked a pipe, and chewed a great deal.

Accidents.—Blow on left leg by a block of ice at the age of forty.

Operations.—None.

Present Illness.—Six weeks before entrance to hospital, after drinking a bottle of beer, patient was unable to void. Next day he went to a doctor, who catheterized him and later dilated him, but this brought no improvement. A short time after the urinary trouble came on the patient said he noticed his legs and knees growing weak, later his back grew weak, and during the last two weeks he was unable to work because of weakness in his hands and arms. He thought his arms had been growing progressively weaker ever since the trouble first began. It seemed to him that his arms and legs had decreased in size since the onset of the weakness. This failing in the musculature

he noticed particularly in the left hand. There had been a feeling of coldness on the ulnar side of the left arm. Patient said he had walked with some slight stiffness of his right leg for about nine years. He always wore out the toe of his right shoe long before the left. There was nothing wrong, subjectively, in the cranial nerves. There was no gastro-intestinal or cardiorespiratory complaint.

Physical examination showed a rather well-developed, poorly nourished man, very reticent and impaired intellectually, and apparently very weak. He walked with much effort, and his gait was spastic in both legs, more in the right. His face and hands were tanned from exposure, otherwise his skin was normal. His head was normal in shape and contour, and showed no signs of injuries. The eyes showed normal function of the external muscles; the pupils were equal, round and regular, and reacted to light and accommodation. Nose negative. Teeth in poor condition, some pyorrhea. Tonsils negative. Throat covered with pus and mucus. Tongue protruded toward the left, with light tremor, but could be moved from side to side easily. The neck was negative except for enlarged posterior cervical glands on both sides. The chest was not well built and supraclavicular hollows were well marked. There was slight asymmetry due to atrophy of the left deltoid and pectoral muscles. The left side was more prominent than the right, and the left scapula bulged slightly. The lungs showed impaired resonance on the right side, but were otherwise negative. The heart was normal in outline, sounds of good quality and regular, and no murmurs. The axillary glands were palpable on both sides. The abdomen was flat, soft, no tenderness, no masses. Liver palpable 2 cm. below the right costal margin. Spleen not palpable. Inguinal glands much enlarged on both sides.

The back showed a scoliosis to the right. The spine was stiff; no tenderness.

Genitalia negative.

Extremities: There was marked atrophy of the left deltoid and pectoralis, and all the muscles of the left arm and forearm were smaller than the right. There was atrophy of the thenar

eminence and interossei of the left hand. Patient could not accomplish ulnar and median group movements with the left hand, and there was almost total loss of strength. The right arm was negative, but there was some atrophy of the interossei and muscles of the thenar eminence of the right hand, with slight loss of power. Both legs were somewhat spastic. There was an enlargement of the tibia just above the left ankle from a previous injury. Double hallux valgus. Some atrophy of the left calf.

Reflexes.	Left.	Right.
Triceps	−	−
Radial	−	−
Biceps	−	−
Abdominal	−	+
Cremasteric	−	+
Patella	++	+++
Achilles'	+	+++
Clonus, patella-	−	+
Clonus, ankle-	+	+
Babinski	+	+
Oppenheim	+	+

Romberg positive.

Sensory examination showed diminution to touch and painful stimulus over the entire trunk, lower extremities, and ulnar side of the left arm below a line running horizontally just above the right nipple and just below the left nipple. In this area there was inability to distinguish hot and cold. The trunk area was somewhat limited below at the level of the umbilicus, the sensory changes on the extremities being less marked. Extending for two or three segments above the upper limit was a zone of hypersensitiveness. Muscle sense was not markedly disturbed.

Blood Wassermann negative. Spinal fluid under increased pressure, 3 lymphocytes, Noguchi faintly positive, Nonne negative, Wassermann negative, colloidal gold test not done.

Summary of nerve findings:

(1) Lower motor neuron type of paralysis, with atrophy and weakness in right.

(2) Upper motor neuron type of paralysis of both legs.

(3) Loss of motor function in left arm supplied by the fifth cervical to first thoracic segments.

(4) Disturbance or loss of sensation below the second thoracic segment and a zone of hypersensitiveness above.

(5) Urinary retention.

A diagnosis was made of an intramedullary tumor, probably a diffuse gliosis in the lower cervical and upper thoracic regions of the cord.

About two weeks after entrance the patient first complained of pain, continuous and severe in the left shoulder. During the following month until death the pain increased in intensity and involved the entire arm, and finally the trunk and abdomen. There was no marked change in sensations as described. The autopsy was performed by Dr. G. Y. Rusk. The brain was removed and appeared grossly quite normal. There was a diffuse swelling of the spinal cord, fusiform in shape, extending from the third to the seventh cervical segments. Between the fifth and seventh cervical segments there was a brownish-red color deep in the tissue of the cord suggesting a hemorrhage. There was a slight amount of adhesion between the cord and dura along the region of the swelling. There was no evidence superficially that the swelling of the cord caused any compression.

Sections of the swollen cord were taken at various levels, and stained for microscopic study. At the level of the fifth cervical segment a large tumor mass completely replaced the normal cord tissue in the ventrolateral region of the left side, leaving a narrow rim of white substance in the dorsal and lateral regions of the opposite side. The mass was very vascular, consisting of glial cells and fibers diffusely distributed throughout. The gray substance was completely obliterated, but two or three ventral horn cells could be distinguished. The membranes were considerably thickened, and showed evidences of inflammatory reaction. At levels above and below the sixth cervical segment the tumor mass could be seen, extending above the second cervical segment and below to the eighth cervical. There was no evidence of cavity formation.

Microscopic diagnosis: Glioma.

Etiologically this case furnishes no evidence that central gliosis of the spinal cord is other than a congenitally defective growth of the central glia. The rapid onset of the symptoms in this patient distinguishes the condition from syringomyelia, which is characterized by slow growth and gradual onset of symptoms as cavities are formed, invading the nuclei and tracts. Both conditions are based on a gliosis, some cases of syringomyelia showing above and below the region of cavitation solid glial masses.

The symptoms in this case are fairly typical. The diminished sensations, with lower motor neuron type of paralysis of the arms, upper motor neuron type of paralysis of the legs, and sphincter disturbances constituting a picture of intramedullary lesion. In arriving at a diagnosis of the type of lesion hematomyelia, amyotrophic lateral sclerosis, myelitis, cord tumor, and syringomyelia were considered. It is significant that the patient complained of stiffness in his right leg for nine years. This fact directed our attention to a slow growth with a sudden exacerbation at the time we saw him. The presence of sensory changes of such marked character without muscle pain rendered the diagnosis fairly simple.

Spinal decompression was considered, but deemed inadvisable, as the signs and symptoms pointed to an intramedullary tumor. Sharpe, in the American Journal of Medical Sciences, September, 1919, considers the possibility of drainage of a cavity in syringomyelia, which may result in improvement; but in this case the rapid development of signs and symptoms was against syringomyelia and also an extramedullary growth. Other factors considered against an extramedullary tumor were the absence of root pains, irritative motor symptoms, and Brown-Séquard's syndrome.

CLINIC OF DR. GEORGE E. EBRIGHT

SAN FRANCISCO HOSPITAL

HEREDITARY MYXEDEMA

HEREDITARY cretinism occurs extremely rarely for the reason that myxedema in women generally confers sterility. It is doubtful, indeed, if a woman suffering from myxedema can conceive, but it is possible that myxedema may develop, as in the case here presented, during pregnancy. Congenital cretinism, on the other hand, is very common; in fact, most cases of cretinism may be considered congenital.

October 30, 1912 Mrs. X, living in San Francisco, where cretinism is not especially common, has had three pregnancies and has borne 3 children, all girls. The 2 eldest were ten and seven years old, well developed physically and mentally, and had never been ill. The mother had had "dropsy" with all three pregnancies. The third child weighed 4 pounds at birth. This child and the mother were first seen when the former was thirteen months old. The child showed well-marked cretinism. Its general appearance was that of a six months baby, rather overweight, with scanty hair and eyebrows, dry skin, thick face, broad nose, thick lips, puffy eyelids, had no teeth, had made no attempt to walk, was constipated, did not talk, and took comparatively slight interest in its environment. The child, in short, presented a definite picture of cretinism, not, however, to a very extreme degree (Fig. 215).

The mother presented both mental and physical evidences of myxedema—her face was heavy and eyelids, cheeks, and lips were swollen, the hands and fingers were heavy, the skin was dry and leathery to the touch, perspiration was absent, she was overweight, hair had fallen out to a considerable degree since

the last pregnancy, eyebrows were very scanty, constipation was very marked, her voice had a dry, metallic tone, her mentality was decidedly sluggish, speech was slow and lacked spontaniety. Initiative of action was diminished, showing itself very plainly in the condition of her household—the entire house was untidily

Fig. 215.—Mother with myxedema and child with cretinism.

kept, dust and dirt were everywhere seen, the children's dresses were shabby, their toilettes were neglected—one might figuratively say that the whole house had gone to seed.

By the end of a year under the administration of thyroid extract the child and mother were completely restored to health

and all traces of hypothyroidism had disappeared. The mother was normal mentally, her weight had diminished, the hair of the scalp, eyebrows, and body had returned to normal, the skin had lost its dry, leathery character, the voice had lost its peculiar quality, myxedematous swelling of the tissues generally had disappeared. Likewise the child had made rapid and normal development, which hardly need be detailed here except to say that normal speech developed, the abnormal puffiness disappeared, dentition took place, and the mental state of the child became normal. The teeth, however, decayed badly soon after appearing.

The child received from the beginning 1/12 grain of thyroid extract three times a day, and the mother 15 grains a day, which was continued in each instance for the space of a year. Since that time, which is now ten years, no medication has been necessary. The lagging function of the thyroid in both mother and child appears to have been stimulated to normal activity by the action of the thyroid extract.

This case presents a number of interesting considerations which emphasize the interrelation between the generative function, which may in this connection be considered essentially the function of the ovaries, and the function of the thyroid gland. This relation is recognized in the enlargement of the thyroid during normal menstruation and gestation. Myxedema may occur as a family disease, several cretins having been born of the same mother, as first described by Brissand and Hertoghe in 1899. While myxedematous women are apt to be sterile, women with hyperthyroidism, on the contrary, appear to be more prolific than the general average. Congenital Graves' disease has been described in the fetus by White in the Proceedings of the Royal Society of Medicine, 1912, in which the exophthalmic goiter began in the mother when she was five months pregnant. Numerous cases of hyperthyroidism have been reported as having been transmitted through the mother's side either to the son or daughter. MacIlwaine reports a woman who suffered from Graves' disease later developing myxedema, was given thyroid extract for about three years, and improved.

One year later her first child, a girl, was born, who showed cretinism beginning at one year of age after a severe illness.

It may be concluded that a state of irritability or instability of the thyroid gland in the mother may be transmitted to her children, and may take the form either of abnormal increase or diminution of thyroid activity, and that a woman having Graves' disease may transmit hyperthyroidism to her offspring. That while myxedema usually produces sterility, nevertheless myxedema may develop in the mother during pregnancy and that it may produce hypothyroidism in her child.

Further, that in the case above reported the woman developing myxedema as a result of pregnancy, a comparatively small amount of thyroid extract was sufficient to restore her thyroid function to normal. It is impossible to deduce from this a general rule, but it is in accord with the fact that where a moderate condition of myxedema occurs with pregnancy it usually disappears without treatment. Finally, it is interesting to observe in the child here reported that long-continued administration of the extract of thyroid gland was not necessary.

CLINIC OF DR. PHILIP H. PIERSON

STANFORD UNIVERSITY HOSPITAL

POSTINFLUENZAL LUNG CONDITIONS

IN presenting a clinic this morning on postinfluenzal lung conditions I am going to show 4 cases which represent not rare or unusual types of disease, but illustrations of a few of the many cases now coming to our attention, and in whom we must know somewhat of the pathology of influenzal pneumonia to understand correctly such after-effects as are here represented. It is generally agreed that the so-called "influenzal pneumonia" was caused by a streptococcus or pneumococcus which gained entrance through the upper respiratory tract, and produced an acute hyperemia of the tissues with a serosanguineous exudate into the trachea, and then by extension into the smaller air-passages. Together with this there was an acute inflammation of the interstitial tissue of many lobules, with the extravasation first of blood and later pus into the bronchioles and alveoli. Thrombosed vessels often led to diffuse small abscesses. The interstitial tissue in many instances was so injured that, with the subsidence of the infection, it did not regain its normal elasticity, and there resulted either a local or a diffuse emphysema. With the addition of other organisms at the time of resolution and because of lack of the powers of the individual to manufacture the necessary ferments to carry on the process of absorption of the exudate, fibrosis took the place of resolution, and a chronic pneumonia was the result. With this there has naturally been the formation of bronchiectatic cavities or larger areas of abscess. Most of these conditions have been found in the lower half of the lungs, for it was there that the pneumonic process was most marked.

It is also generally agreed that the toxins of this severe infection tended very definitely to light up any slumbering or latent tuberculous focus existing in the lungs or at times in the hilus. Those individuals whose tuberculous focus was an apparently healed apical lesion generally developed their active disease in a gradual manner, and its distribution followed that of the original focus. But another group of cases have de-

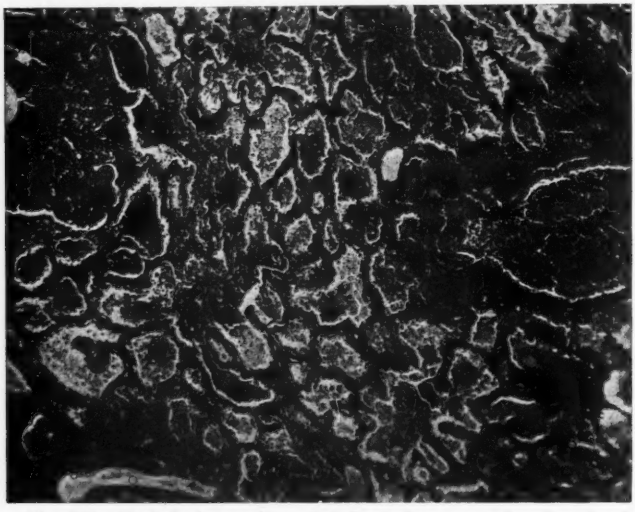

Fig. 216.—Pathologic section of influenzal pneumonia. In the left upper corner there is an area of necrosis; in the central portion there is evidence of interstitial reaction with but little exudate into the alveoli, and on the right-hand margin a bronchus is seen with considerable infiltration throughout the peribronchial tissue.

veloped from a focus in the central portion of the lung, very strongly suggesting the breaking down of tuberculous glands, and the site of their disease has been confined at the start to the midportion of the lung. So it is evident from the extension of this severe infection in the lungs that permanent damage may result both to the alveolar lining and the interstitial tissue, and the toxins may and often do awaken a tuberculous focus, or cause the extensive spread of one already existing.

The first patient I wish to show is a young Italian woman of twenty-seven, single, who consulted me in September, 1919, with the story that she had been perfectly well till October, 1918, when she had influenza and was quite ill. She does not know whether she had pneumonia or not. During the following months she worked in a fruit packing house, but had frequent "colds." In July the symptoms recurred in such severity that she came to me in September. During this time she had a cough and a small amount of expectoration, which was white and never contained blood. At times she had had considerable fever and night-sweats and a dull pain in her right posterior axillary line. Her best weight had been 127 pounds ten years before; her average was 118 and the present was 104 pounds. On physical examination I found a well-developed young woman with some evident loss of weight; mucous membranes slightly pale; her teeth were apparently well kept, although several gold crowns were present; her tonsils were buried. There was no glandular enlargement. Her heart was not enlarged or displaced, it was regular, rate 128, no murmurs and P_2 was greater than A_2. Her chest showed wasting of the subcutaneous tissue over the right upper lung, with limited expansion on this side and more pronounced muscle spasm here than on the left. There was dulness over the right chest above the third rib anteriorly and the midscapula posteriorly. Bronchial breathing was heard over the right chest, especially posteriorly, from the midscapula upward decreasing in intensity. Posteriorly, outside the hilus, there were showers of crepitant râles following postexpiratory cough. Otherwise her physical examination was negative. Her temperature was 100° F. The laboratory tests, aside from the sputum, which showed tubercle bacilli and the *x*-ray which is shown in Fig. 217, were negative. The disease, as presented in this picture, is centrally located on the right side and is associated with cavity formation. This is evidence that the disease had existed for many months prior to September, 1919. She was shortly admitted to Arequipa Sanatorium and pneumothorax instituted. After some time the cavity was collapsed and has remained so ever since. The last *x*-ray

(Fig. 218) shows the other lung in very good condition, with very satisfactory collapse on the right side. She has maintained a weight of 120 to 122 pounds since leaving the sanatorium in spite of working the last six months. Her basal metabolism shows a rather decided rise at the menstrual time. Its possible significance I discussed in a paper on "Periodic Variations in Basal Metabolism Rate in Tuberculous Women" in The American Review of Tuberculosis for January of this year. I have presented this case as illustrative of the breaking down of a

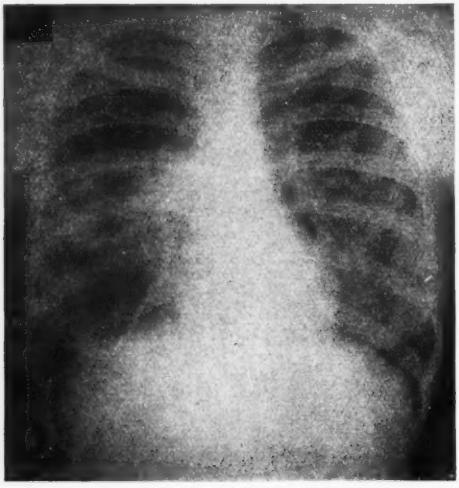

Fig. 217.—Tuberculosis in the right middle lobe with large cavity.

central focus of tuberculosis by the influenzal infection, its advantageous location for pneumothorax compression, the favorable course of the disease as a result of the continued collapse, and her return to work with the apparent cure of the disease which had advanced to the stage of cavitation.

The second patient is a man of fifty, Italian, and a miner by occupation. Had worked in gold mines in California for seven years prior to seven years ago, his work being very largely dry drilling, which was associated with considerable quartz dust.

His story is that he was well till three years ago, at which time he began to be constipated and lost his appetite. He has also had a cough, mostly at night, with a small amount of greenish-white sputum, but no blood. He complains of no pain in his chest or shortness of breath, but at times has had fever and night-sweats. The absence of shortness of breath is unusual in miners who have been at that occupation any considerable

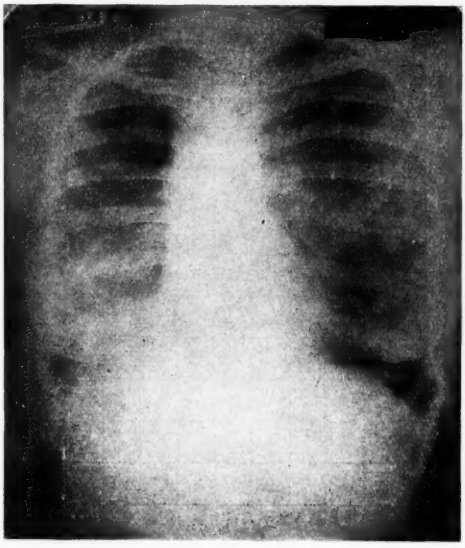

Fig. 218.—Same patient as in Fig. 217 three and one-half years later with very satisfactory collapse of right lung by pneumothorax.

time, its presence being, in general, one of the most frequent symptoms and possibly due to the extensive fibrosis which is a concomitant of this form of pneumoconiosis. One month ago he contracted what appeared to be a severe case of influenza, with a bad cough and more expectoration. His past history is negative except for measles and whooping-cough in childhood, and his family history is negative, including no exposure to tuberculosis. Now his weight chart is a very important factor

in interpreting the history of his disease. His best weight was two years before he entered the mines, and was 170 pounds. On entrance he weighed 165 pounds and maintained this until he left seven years later. During the past seven years he has dropped to 150 pounds; this he has maintained for several years until one month ago.

By referring to his *x*-ray it seems very probable that during the time prior to one month ago he was developing a slowly

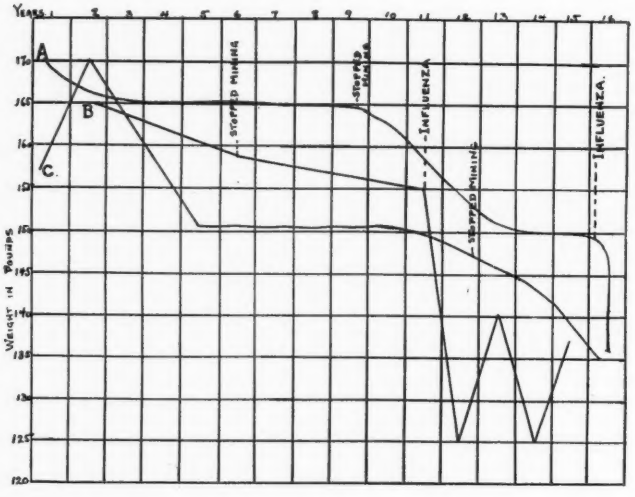

Fig. 219.—Curve *A* is weight curve of miner whose history is discussed. Curve *B* is of another quartz miner who developed tuberculosis after an influenzal infection. Curve *C* is of quartz miner who developed tuberculosis gradually and not as the result of an acute disease.

progressing low-grade tuberculosis in his right upper lobe. This was fairly quiescent, as evidenced by the amount of scarring present. We are particularly interested in what developed during the past month. On physical examination we find a thin, anemic, cyanotic man with teeth that need care, tonsils which are infected, and no glandular enlargement. His heart is negative. His lungs show wasting over the right apex, with

slight spasm. There is some limitation of motion and slightly more spasm over the left anterior chest. At the right apex there is bronchial breathing and a few subcrepitant râles posteriorly, with postexpiratory cough, and the whispered fremitus is considerably increased over the upper lobe. These are the signs of an old and possibly only very slightly active process. Anteriorly over the left chest there is very much diminished breathing of a fairly normal character. Posteriorly from the angle to the spine of the scapula is dulness with harsh expiration and

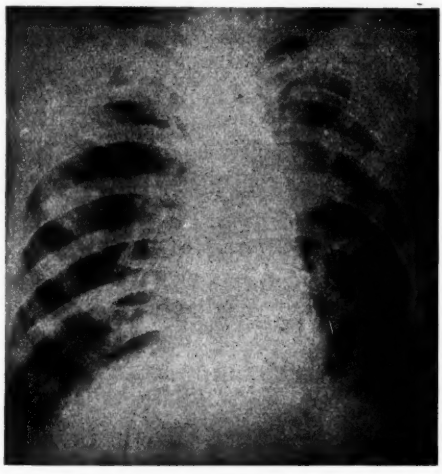

Fig. 220.—Pneumoconiosis with old tuberculosis in the right apex and a postinfluenzal acute tuberculosis at the left hilus.

large showers of crepitant and subcrepitant râles, with postexpiratory cough only. This suggests a more active process, especially if we include with these findings the spasm and limitation of motion on the left side mentioned before. Again referring to the *x*-ray, we see about this left hilus a very considerable enlargement of the bronchial glands and a fuzzy infiltration radiating outward. Together with this he has lost 14 pounds this last month since his influenza, and I feel that this was probably the cause of the active process at his left hilus. The

dense mottling present in both lungs, more throughout the central part, is the fibrous reaction to the quartz dust.

May I take this opportunity, while speaking of the value of a careful weight chart, to show a few others in a rather large series of quartz miners that we have had the opportunity to see and examine. It will be noted that in many they very comfortably maintain a normal weight for years, but when a tuberculosis gradually appears there is a slightly downward tendency to this curve (curve B). If a larger area breaks down the fall

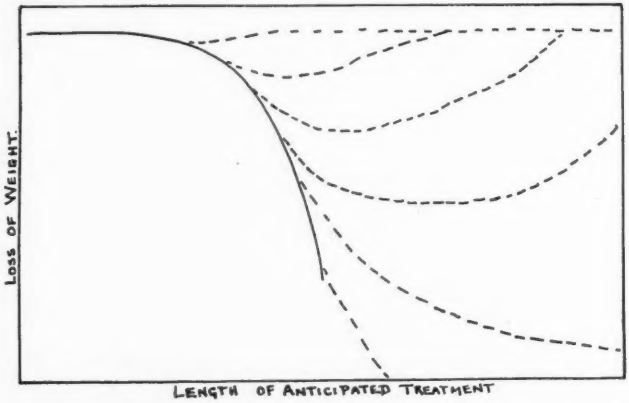

Fig. 221.—Theoretic weight chart showing relation between loss of weight (solid line) and effect of thorough treatment on weight, indicating toward the right the probable length of time necessary to arrest the disease, the horizontal dotted line indicating normal weight.

is more abrupt (curve C), and the steeper this curve becomes, the graver our immediate prognosis (Fig. 221). Would not a monthly weight chart at the mine be a decided help in determining early tuberculosis, a disease we must be constantly on the watch for when dealing with quartz miners? I have constructed a hypothetic chart indicating losses of weight by the solid line, and the length of treatment and probable outcome by the dotted line. They are somewhat like tangents to a circle at given arcs. What has been said of quartz miners is not at all true of coal miners. In the latter the reaction, probably much more acute,

washes out the irritation and, consequently, much less fibrosis develops. It has been said, and probably truthfully, that coal-miners withstand tuberculosis better than the average individual, and this may be so because the type of reaction fails to clog the lymph-nodes, and consequently the action of the mononuclear cells is more efficient. The treatment for this miner is absolute bed rest under hygienic and cheerful environment, but no specific therapy is indicated at present.

The third patient is a young woman of thirty-four who has never been strong, although fairly robust for her age and height. Prior to five years ago she had had frequent "colds" and had noticed at times a little wheezing in her chest especially with these infections. In December, 1918 she had a severe influenzal pneumonia and was in bed three months. Her husband died of pneumonia at this same time. She was three months pregnant and miscarried. Following her influenza she quickly regained her weight, but has less strength and ambition and has more shortness of breath and wheezing. Her cough became constantly present, and the expectoration greenish; lately the sputum has a distinct numular form. She has frequently noticed a little fever between 99° and 99.6° F. in the afternoon, and this is more often present if she is excited. She is much more nervous than prior to her influenza, and at times is mentally depressed. She has used a great deal of catharsis and now has a very sluggish bowel and a large amount of gas which presses up against her diaphragm and adds to the discomfort in her chest. This winter she passed through a moderately severe bronchopneumonia and now is back very much to her previous condition. Her best weight was 145 pounds eleven years ago; her average weight prior to the influenza was 130 to 135 pounds. After the influenza she dropped to about 90 pounds and within a year had returned to 126. When I saw her three years ago she weighed 137 pounds, and now her weight is about 144. Her past history is negative except for the frequent respiratory infections mentioned above, and measles and whooping-cough as a child. The family history is negative, including no exposure to tuberculosis.

On physical examination she is well developed and nourished, there is a slight cyanosis and a number of small pustules on her face and body. Her teeth are in good condition. She has small but ragged tonsils and considerable postnasal discharge. This has been investigated, and it was found that the right antrun was infected, and this has been washed at frequent intervals so that there is much less of this infection than formerly. There is no adenopathy. Her heart is not enlarged or displaced, it is regular, its rate being between 70 and 80, there are no murmurs, P_2 is greater than A_2. The blood-pressure has remained approximately 120 systolic and 80 diastolic for these three years. An electrocardiogram taken within two months showed no abnormality. Her lungs originally showed moderate dulness at the bases, with prolonged expiration throughout both lungs. Throughout the lower two-thirds of both lungs there were numerous coarse indeterminate râles increasing in amount toward the bases. The apices have always been clear. A recent examination showed that instead of there being any spread of the disease with the bronchopneumonia, the left side particularly has made some progress, the moisture now being confined entirely to the lower third. There are fewer râles on the right, although they extend over much the same area as before. There is less sputum than there was three years ago. Her present vital capacity is but 50 per cent. of normal. There is rather marked clubbing of the fingers. There are no abnormalities in the abdomen or extremities except gaseous distention of the bowels. *x*-Ray studies of her gastro-intestinal tract as well as physical examination and laboratory tests have shown no foci of infection about either the gall-bladder or appendix, and the urine shows no pus. Numerous sputum examinations have been negative for tubercle bacilli and culture has shown a mixed infection with Streptococcus non-hemolyticus predominating.

The condition manifested here is a diffuse emphysema with numerous bronchiectatic cavities in both lungs, especially the right. We frequently see this type of postinfluenzal infection, either diffuse, as here represented, or localized in a smaller area,

and, as suggested earlier, an understanding of the pathology of the influenzal pneumonias shows how logical is such a condition. With the severe inflammation and necrosis in the interstitial tissue there doubtless were many areas of destruction and the elastic tissue entirely lost its tone. As shown in her *x*-ray, there is considerable overgrowth of fibrous tissue, and this, associated with the necrosis, has caused the dilatation of the bronchioles and the resultant bronchiectatic infection. Now

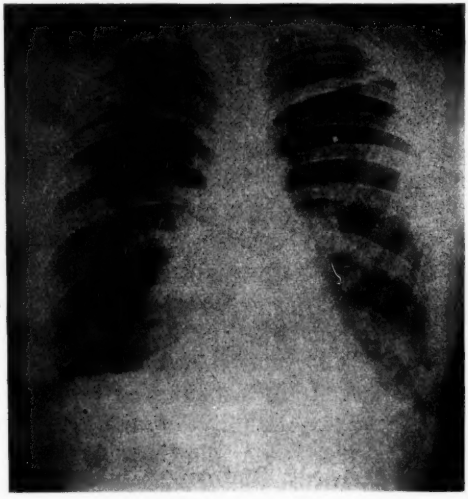

Fig. 222.—Non-tuberculous diffuse emphysema with bronchiectasis secondary to influenzal pneumonia.

I think there are three factors at work in this patient, and they must all be considered. First, due to the frequent respiratory infections in early years, her lungs were more susceptible to the severe pneumonic infection; second, the destruction of normal tissue and its replacement with fibrous tissue as the result of the influenzal pneumonia, and third, the upper respiratory infection —sinus—which was a constant source of reinfection in these lungs. I cannot emphasize too strongly the relation which upper respiratory infection—generally sinusitis—bears to chronic

pulmonary infection. Negative *x*-ray pictures of the sinuses are not enough to rule out their infection. History of frequent nasal or postnasal catarrh, together with the objective finding of this yellow discharge, collected separately for each nostril and throat in handkerchiefs and brought in by the patient for your own inspection, are unmistakable evidence of sinus infection. Conservatism is preferable for a certain time, especially when dealing with the ethmoids, but complete drainage of the antra and frontal sinuses is early indicated in these cases. Diseased tonsils, too, are better out than in. In other words, make an exhaustive search for infection in the upper respiratory tract as a focus for the continuation of the pulmonary infection. There is naturally absorption from the purulent area in the lungs, and this has a toxic effect on the heart muscle, giving it less reserve than normal, and thereby contributing to the dyspnea which is present, particularly with exertion. A part of this dyspnea may also be due to diminished aërating surface in the lung tissue. Attention has been devoted to emptying these pus pockets as completely as possible every day. At least once or twice daily she assumes the knee-chest position for about twenty minutes after a hot drink containing such an expectorant as ammonium carbonate. In this way she removes at one time a good deal of this pus and is relieved of the constant coughing and the toxic absorption. Her diet is so arranged that she slowly eats food that produces as little gas as possible and which will aid her bowel action. I have used a few Kingscote breathing exercises with possibly some betterment of her breathing ability. Graded exercise is very advisable with a rest period at midday and early retiring at night. I think, too, she should do some light work, the better to keep her mind off herself, and thereby make her feel that she has a definite place in the world's social economy. Nothing to do but sit around and cough and expectorate is not conducive to her health or peace of mind nor to the happiness of others. A mild equitable climate is helpful in many of these cases, as is also an autogenous vaccine in reducing the amount of expectoration.

To summarize this patient, then, we have an example of

postinfluenzal diffuse emphysema with bronchiectasis, where we must remove upper respiratory infection and adapt the individual to the new environment with as much cheerfulness as possible. At best there is irreparable damage already done, and our treatment must be largely symptomatic.

The fourth patient is a boy of twelve, who was perfectly well until four years ago, when he had severe influenzal pneumonia. Following this his cough and expectoration persisted for two or three months. Then he was fairly well except for frequent chest "colds," which lasted only two or three weeks, till one year ago, when a more severe respiratory infection occurred. This lasted five or six months and was accompanied by yellowish-green sputum and some fever much of the time. He seemed free from the cough and expectoration for two or three months, when they again returned, associated with fever and several night-sweats. At times the sputum, about 8 ounces a day, has been pink, but no pure blood has been expectorated. His best weight was 84 pounds one year ago; his weight when he first came to us was 77 pounds, and this has increased to 80 pounds. The average weight for a boy of his height and age is 83 pounds. On physical examination he is well developed and fairly well nourished, his mucous membranes are pale. His pupils are equal and react to light and accommodation. Several teeth show evidence of decay and should be cared for. The tonsils were removed cleanly five years ago, not for sore throats, but because they were "enlarged." He breathes somewhat through his nose, but adenoids are not present. The upper anterior and posterior cervical glands are enlarged more on the left than right. His chest is flat and fairly long, with possibly slight limitation of motion on the left. At the time of the first examination there was moderate dulness at both hilus regions posteriorly, and also considerable dulness at the left base below the angle of the scapula. Over this latter region, when he first came to us four months ago, there was diminished breathing and a few coarse indeterminate râles. His abdomen protrudes somewhat, but its contents are apparently normal. There is definite early clubbing of his fingers. His blood-count

was normal except that the white count was 20,850 with 79 per cent. polymorphonuclear cells. Six sputum examinations have shown no tubercle bacilli. He was immediately put on postural drainage twice daily and the fever disappeared at once. The sputum was reduced in amount to about 2 ounces a day, but this has increased slightly at times. Investigation of his upper respiratory tract shows no definite focus of infection, although

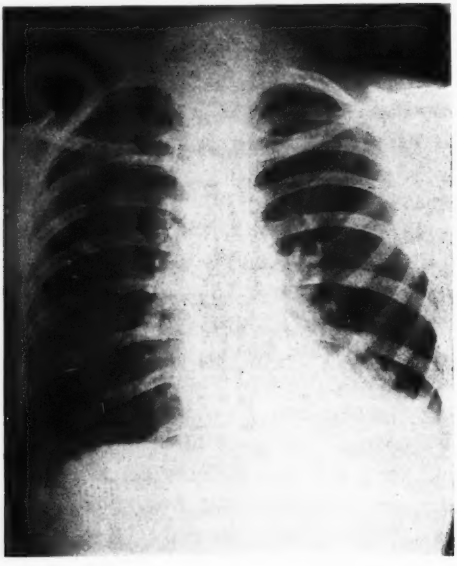

Fig. 223.—Postinfluenzal chronic pneumonia in left lower lobe.

there is a slight suspicion of sinus disease. His teeth will receive attention.

I have presented this case because it illustrates another type of postinfluenzal chronic infection. In this case we have a chronic pneumonia located in the lower lobe. These are the most common types of postinfluenzal non-tuberculous infection. They frequently appear at first as small localized areas of emphysema, and are doubtless the result of small areas of necrosis

and loss of tone and strength of the interstitial tissue. Following upon this there are repeated infections with apparent freedom between attacks, but I doubt if the physical signs ever entirely disappear. With these repeated infections there is the overgrowth of fibrous tissue, and eventually small bronchiectatic cavities are found. In this boy we have, added to a severe pulmonary infection, the fact that he is only twelve

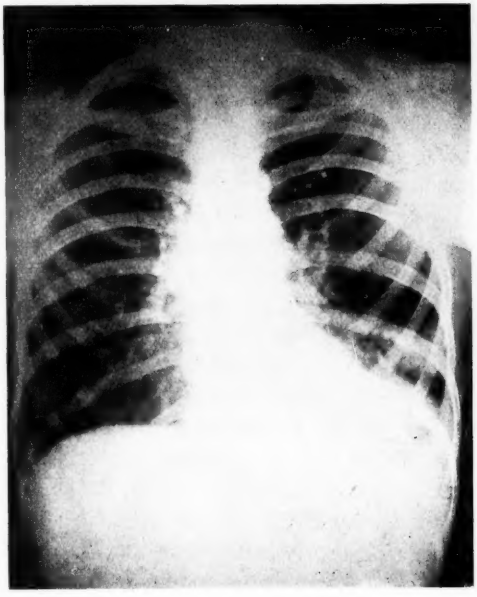

Fig. 224.—Same case as Fig. 223 showing some extension of the process in three months.

years old, and radical measures should be avoided if there is reasonable hope that conservatism will restore him to health. I cannot but feel that where the process has persisted for four years, where there is evidence of considerable fibrosis and pleural adhesions, where there is beginning clubbing of the fingers, that we are dealing with a process which will not get well of its own accord. And the extent into which it has now spread makes

me feel that it is of serious moment, for even in three months there was some spread of the process both in the *x*-ray and on physical examination. (I should state that at his examination this month the breathing was bronchial over the left lower lobe posteriorly, and the whisper suggested an amphoric nature in the posterior axillary line in the eighth interspace. This I interpret, in view of the *x*-ray findings as a possible large bronchiectatic cavity or small abscess.)

Granted that this boy has a chronic process with considerable fibrosis in a lower lobe which will probably not get well of its own accord, but may and probably will extend with more bronchiectasis, what treatment should we suggest? Medical treatment consists in postural drainage, hygiene, and such tonics as iron iodid and cod-liver oil, and the removal of all foci of infection. I feel that if we are to permanently help him we must resort to surgery, far from satisfactory as it is today in this type of case. Pneumothorax will probably not collapse this area even if it is free from the diaphram—which it is not—because of the fibrosis. It would also collapse too much good lung tissue for the comparatively small area of diseased tissue. This leaves thorocoplasty and lobectomy. I am in favor of thorocoplasty, possibly supplemented by pulmotomy, first, as this will not subject him to any great risk, and second, it may check the progreess of the disease. If it does not, I think we should tell the family of the seriousness of lobectomy, although children seem to stand it better than adults, and then advise that operation. In early cases within possibly six months of the onset, before extensive fibrosis has developed, I feel pneumothorax might be of considerable help. In a number of patients with small processes and without much reaction I feel that a definite improvement is noted with autogenous vaccines. During any acute exacerbation they too must institute postural drainage, thereby favoring the process of healing.

SUMMARY

I have presented 4 patients illustrating rather common post-influenzal pulmonary conditions. One, tuberculosis particu-

larly favorable to pneumothorax therapy; two, tuberculosis in a quartz miner spreading very rapidly because of the type of pneumoconiosis. Here also we should anticipate the onset of tuberculosis by a carefully kept weight chart, there being a loss of weight before symptoms, other than are common with miners, appear; three, non-tuberculous diffuse emphysema with bronchiectasis, a condition very chronic and offering little opportunity for specific therapy; and four, non-tuberculous chronic basilar pneumonia offering a chance of recovery by the use of such surgery as thorocoplasty or possibly lobectomy.

CLINIC OF
DR. J. MARION READ
DR. R. STEWART HIATT

ST. LUKE'S HOSPITAL

CLINICAL VALUE OF THE GOETSCH TEST

SINCE the publication five years ago of Goetsch's original description[1] of the epinephrin chlorid test there have appeared a score or more of articles upon the subject. With the exception of those by Goetsch himself and three or four others these have in most cases cast doubt upon its value as an indicator of thyrotoxicosis. Some definite facts, however, have been revealed regarding the reaction, namely, its form, its frequency of occurrence, and its concomitant phenomena, such as heat production.[2] It now becomes evident that performance of the test yields information concerning the patient's physiologic processes not heretofore obtainable, and as such may be of value, but its particular significance is still a matter of controversy, and its reliability as a test for so-called hyperthyroidism remains a debatable question.

A brief but comprehensive survey of the literature on the Goetsch test is contained in an article by Russel, Millett, and Bowen,[3] who point out that most investigations carried on to substantiate or disprove the reliability of Goetsch's contentions have led the investigators to the conclusion that sensitiveness to epinephrin is not pathognomic of increased thyroid activity. Woodbury[4] in this country, Turro,[5] Bernard,[6] and Troell[7] abroad, are inclined to support Goetsch. The conclusion of Peabody, Sturgis, Tompkins, and Wearn,[8] who performed it on different classes of subjects, is typical of those workers who are unable to substantiate Goetsch's results. They say: "The positive re-

actions to epinephrin appear to occur most often in highly nervous individuals, but are not constant in such persons. The clinical significance of the reaction is not clear, but at present it should certainly not be regarded as having any special significance in the diagnosis of hyperthyroidism."

Goetsch has somewhat modified the first claims made regarding the diagnostic value of this test. In a recent publication he says, "This test always confirms and usually establishes the diagnosis of hyperthyroidism. When positive, the test is an indicator of hypersensitiveness of the sympathetic nervous system. There is a small percentage of clinical conditions which give a more or less positive reaction and which are not dependent upon definite pathologic change in the thyroid gland. However, the test is positive in all cases of hyperthyroidism. Furthermore, of all the diseases which may possibly be associated with a hypersensitiveness sympathetic, hyperthyroidism is by all odds the most common. In the presence of a negative response to the test, one can state definitely that hyperthyroidism is not present."[9]

In an endeavor to diagnose incipient exophthalmic goiter Hewlett[10] performed a considerable number of epinephrin injections and found that no definite relation seemed to exist between susceptibility to epinephrin and the milder degrees of hyperthyroidism.

Leib and Hyman,[11] in reporting some recent experimental work, make the statement that "Hypersensitiveness to adrenalin is not due to changes in the thyroid, but to changes in the involuntary nervous system"; and arrive at the conclusion, "There is no scientific basis for the value of the so-called Goetsch test in the diagnosis of thyroid disease."

From the foregoing one gains the impression that the reliability of this test has not been determined to the satisfaction of all observers. It is being performed, however, by many clinicians and its results made the basis for medical, surgical, and Roentgen-ray treatment.[12]

Most of the studies heretofore reported were undertaken with the expressed intention of ascertaining the value of this test

and were controlled to the extent seemed necessary by each investigator. Other functional tests, as deterimation of the basal metabolic rate,[2] and carbohydrate tolerance,[3, 4] were also carried out with notes recorded of the clinical signs and symptoms of thyrotoxicosis presented by each patient.

It has seemed adviasble to report the results obtained by us because of the different circumstances under which the work was done. All the subjects were patients referred to the Diagnostic Group at St. Luke's Hospital for diagnosis of more or less obscure ailments, detection of which had eluded the family physician. The work was started soon after Goetsch had published his original description of the technic of the test. Performance of the test was routine in all cases which presented signs or symptoms suggesting thyroid disturbance or obscure nervous manifestations, and it was hoped that it would yield valuable and heretofore unobtained i formation. During the early part of this work estimations of the basal metabolic rate were not obtainable, but after the installation of a respiration calorimeter in September, 1920, an estimation of the basal metabolic rate afforded additional information regarding the thyroid activity of each patient.

These data here presented were compiled from tests performed on 59 patients. In 40 cases the test gave results which were interpreted as positive according to the criteria set forth by Goetsch,[1] *i. e.*, an increase in pulse-rate of 10 or over and an elevation in blood-pressure of 10 points or over with aggravation subjectively and objectively of the cardinal symptoms and signs of thyrotoxicosis. The primary rise in pulse-rate and blood-pressure with a moderate fall and secondary rise were noted in the performance of the tests, and it was thought desirable to represent these changes graphically. This was done by tabulating the number of points rise (or fall) in pulse-rate or blood-pressure at each reading over the reading taken just before the injection of epinephrin. The base line was determined by averaging the readings in all cases before the epinephrin injection. This was 79 for the pulse-rate, 106 for the systolic, and 68 for the diastolic blood-pressure. There is noted an in-

crease in pulse-rate to 10.4 at fifteen minutes, a slight fall and then secondary rise to 11.9 at thirty minutes. This curve, shown in Fig. 225, conforms to the description of Goetsch,[1] though the secondary rise comes sooner than noted by him. A widening of the pulse pressure is clearly shown in this figure, the systolic pressure averaging 11.1 points above the base line at twenty minutes with a smaller drop in the diastolic pressure. This increase of the pulse pressure seems to be a fairly constant

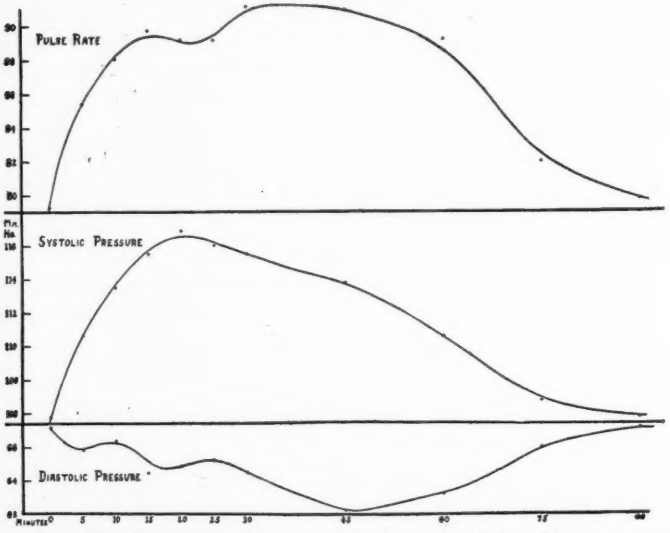

Fig. 225 shows the pulse-rate, systolic and diastolic blood-pressure changes for one and a half hours after injection of 0.5 c.c. of adrenalin. The curves represent the composite reaction in 40 patients who reacted positively to the test.

and definite finding, having also been noted and charted by Hewlett.[10]

The 59 cases comprising this series were not a selected group except that all were chronically ill and presented signs or symptoms of nervous disturbances which might rest on a basis of disturbed thyroid function. This was by no means the presenting symptom in every case, but under the plan of study carried on an endeavor was made to reveal all the pathology

which the patient harbored; each symptom and sign was investigated as to its etiology and bearing on the major disease.

In Table 1 are presented the major diagnoses made in all the cases of this series which are grouped according to their response to minimal doses of epinephrin. The great frequency of focal infections in these patients may be of significance and their incidence has been incorporated in the table.

TABLE I

MAJOR DIAGNOSES AND INCIDENCE OF FOCAL INFECTION IN 59 SUBJECTS TESTED FOR EPINEPHRIN HYPERSENSITIVENESS

Major diagnosis.	Response to epinephrin test.			
	Positive.	Focal infection.	Negative.	Focal infection.
Thyrotoxicosis	2	2	2	2
Hypothyroidism	2	0	3	2
Menopause	2	2	1	1
Irritable heart	3	2	0	0
Psychoneurosis	2	2	1	1
Neuralgia	3	3	0	0
Petit mal	1	0	0	0
Epileptoid attacks	2	1	2	1
Neurasthenia	1	1	0	0
Visceroptosis	6	4	1	1
Focal infection	3	–	4	–
Colitis	3	3	0	0
Pulmonary tuberculosis	3	1	0	0
Cholecystitis	2	0	1	0
Hepatic cirrhosis	1	1	0	0
Uterine fibroid	1	1	0	0
Carcinoma	1	1	0	0
Nephritis, chronic	1	1	0	0
Cardiac decompensation	1	0	1	1
Peptic ulcer	0	0	2	1
Syphilis	0	0	1	0
	40	25	19	10

That hypersensitiveness to minimal doses of epinephrin may be possessed by patients suffering from a diversity of pathologic

conditions becomes apparent from the table. It is noteworthy that only 2 presented signs and symptoms which warranted the diagnosis of thyrotoxicosis. It is especially to be noted that an equal number presented the clinical picture of thyroid insufficiency, yet reacted positively to the test. The details of these latter are as follows:

Case No. 1109. Female, thirty-two years. Complains of dry skin and inability to perspire; feels sleepy, but does not sleep well; feels irritable and nervous and has pain in the back of the head. She states that her mental faculties are not so acute as formerly, and she has gained 15 pounds in weight. Examination shows marked hypertrichosis, very dry skin, pulse-rate of 69, blood-pressure, systolic 112, diastolic 60, and a basal metabolic rate of minus 23.2 per cent. The reaction to 0.5 c.c. of adrenalin was marked, with elevation of the systolic blood-pressure 34 points above the resting pressure before injection and an increase in pulse-rate of 24 beats per minute. There were also noted pallor, tremor, sweating, and palpitation.

Case No. 1115. Male, sixty-one years. Complains of constipation; seldom perspires, and feels the cold intensely. Examination shows dry skin, short, stubby fingers with flat nails. His pulse-rate was 44 and blood-pressure 90 systolic and 60 diastolic. The basal metabolic rate was minus 31 per cent. The Goetsch test was positive, there being an increase in the systolic pressure of 18 points and a pulse-rate increase of 20 beats per minute. There were no subjective manifestations.

Since its originator claims that "the test is positive in all cases of hyperthyroidism," it is necessary to give some of the diagnostic points indicating thyrotoxicosis in those 2 cases so diagnosed, but who showed no hypersensitiveness to epinephrin.

Case No. 937. Female, fifty-two years. Complains of enlarged thyroid gland and palpitation; says she is 7 pounds below her normal weight; is constipated has some mental depression, and is nervous. Examination reveals moderate enlargement of the right lobe with slight but definite enlargement of the left lobe and isthmus; tremor, fine in character; no exophthalmos, but positive Moebius sign; pulse-rate 90 per minute,

and blood-pressure 172 systolic and 98 diastolic. The epinephrin injection produced an increase of ten beats per minute and a maximum elevation in the systolic blood-pressure of eighteen points. There were no other signs or symptoms. An estimation of the basal metabolic rate was not obtainable.

Case No. 1087. Female, forty-six years. Complained of nervousness. There was no thyroid enlargement or eye signs. Skin was moist and she perspired freely. Pulse-rate was 92 per minute, blood-pressure 128 systolic and 72 diastolic, with a basal metabolic rate of plus 18.2 per cent. Adrenalin injection produced an increase of only two points in the pulse-rate, with the same amount of elevation in the systolic blood-pressure.

The 2 cases cited above are contrary to the general statement that "the test is positive in all cases of hyperthyroidism."[9] Similar cases have been reported by Russell, Millet, and Bowen,[8] who encountered cases of classical exophthalmic goiter showing marked increase of the basal metabolic rate, but exhibiting no hypersensitiveness to epinephrin.

It becomes quite evident that a positive reaction is not pathognomic of so-called hyperthyroidism, for it does not occur in all cases, notwithstanding the insistence of its author that "In the presence of a negative response to the test one can state definitely that hyperthyroidism is not present."[9] Decidedly positive reactions in frank cases of hypothyroidism further enhance the difficulty of establishing an association between epinephrin hypersensitiveness and thyroid function.

It has been noted by other observers[8] that a positive response is frequently encountered in patients suffering from acute infections. The extreme frequency of chronic focal infection in the patients studied by the diagnostic group and the endeavor to unearth all of these foci afforded an opportunity to ascertain if there is any association between epinephrin hypersensitiveness and focal infection. Table 1 shows that 62 per cent. of patients reacting positively have focal infections, while the figure for those responding negatively is 52 per cent. The difference is slight but significant despite the fact that the sample of 59 c ses is a small one. That it is a fair sample was ascertained by check-

ing the incidence of focal infections in the serial 300 cases (Nos. 900–1200) of which the 59 were a part.

The frequency of positive reactions by women in the menopause was noted in reviewing the 59 case records which constitute this series. Certain it is that the manifestations occurring at that time of life are not unlike those which accompany a positive reaction to minimal doses of epinephrin. And here we are reminded of the one point upon which all workers who have studied this phenomenon are agreed, namely, that a positive reaction indicates hypersensitiveness or hyperirritability of the sympathetic nervous system.

If one remains uncommitted to any theory as to the pathogenesis of thyroid disease, more particularly that form called hyperthyroidism, or better, thyrotoxicosis, and endeavors to study the clinical signs and symptoms, it is observed that they seem to fall into three groups. One group is composed of manifestations of toxemia, a second of alteration in the metabolic functions of the body, and the third of disturbances in the vegetative nervous system. The great diversity of types and bizarre forms one encounters seem to be produced by predominance of one group of signs and symptoms over those of the other two groups. If this viewpoint is accepted there ceases to be any inconsistency when a high metabolic rate is encountered in a patient with a negative response to epinephrin, for the amount of metabolic disturbance does not necessarily parallel the height of toxemia or degree of upset suffered by the vegetative nervous system.

Granting the above, all controversy as to the relative merits of the Goetsch test and metabolic rate determinations is entirely without point. Neither one is acceptable as a quantitative measure of thyroid activity, though each contributes information regarding the pathologic physiology of the body. The situation may be best summed up by a quotation from a very recent editorial,[13] "As usual, the conflict of opinion is with theories of pathogenesis, not with the facts of direct observation."

BIBLIOGRAPHY

1. Goetsch, Emil: Newer Methods in the Diagnosis of Thyroid Disorders; Pathological and Clinical, New York State Jour. Med., 18, 259, July, 1918.
2. Boothby, W. N., and Sandiford, I.: The Effect of Subcutaneous Injections of Adrenalin Chloride on the Heat Production, Blood Pressure, and Pulse Rate in Man, Amer. Jour. Physiol., February, 1920.
3. Russell, N. G., Millet, J. A. P., and Bowen, B. D.: Clinical Studies in Functional Disturbances. Study I. Functional Thyroid Tests as an Aid to Differential Diagnosis, Amer. Jour. Med. Sci., 162, 790, December, 1921.
4. Woodbury, M. S.: A Comparison of Methods for Determining Thyrotoxicosis, Jour. Amer. Med. Assoc., 74, 997, April 19, 1920.
5. Turro, Ramon: Emotions and Endocrinology, Siglo med., Madrid, 56, 3444, December 13, 1919.
6. Bernard, A.: Review of Recent Works on Action of Epinephrin in Hyperthyroidism, Progres med., 34, 19, May 10, 1919.
7. Troell, A.: The Diagnosis of Exophthalmic Goiter, Hygiea, Stockholm, S. 2, No. 2, January 31, 1920.
8. Peabody, F. W. Sturgis, C. C., Tompkins, E. M., and Wearn, J. T.: Epinephrin Sensitiveness and its Relation to Hyperthyroidism, Amer. Jour. Med. Sci., 161, 589, April, 1921.
9. Goetsch, Emil: The Epinephrin Hypersensitiveness Test (Goetsch) for Hyperthyroidism, Endocrinology, and Metabolism, ed. 1, New York, D. Appleton & Co.
10. Hewlett, A. W.: The Action of Tyramin on Man, Arch. Int. Med., 21, 411, March, 1918.
11. Leib, C. C., and Hyman, H. T.: Study of Graves' Syndrome and the Involuntary Nervous System. VII: On the Mechanism of Sensitization to Sub-cutaneous Injections of Adrenalin, Amer. Jour. Med. Sci., 63, December 1, 1922.
12. Tarnanceanu, The Goetsch Test and Roentgenotherapy in Thyroid Affections, Jour. de radiol. et d'electrol, 6,501, November, 1922.
13. ———— The Test of Hyperthyroidism, editorial, Jour. Amer. Med. Assoc., 80, 848, March 24, 1923.

CLINIC OF DR. HIRAM E. MILLER

DEPARTMENT OF DERMATOLOGY, UNIVERSITY OF CALIFORNIA HOSPITAL

RECURRENT MANIFESTATIONS OF SECONDARY SYPHILIS FOLLOWING INADEQUATE TREATMENT

RECURRENT manifestations of secondary syphilis in treated cases are of sufficient importance to warrant discussion. They serve as an index to the efficiency of our mode of treatment. In some text-books on syphilis the subject is entirely ignored; in others it is simply mentioned without an attempt to explain its significance. In the days before the advent of arsphenamin Sir Jonathan Hutchinson stated that those patients who had been freely salivated were less prone to relapse than those who had taken small doses. Fournier believed that those who were insufficiently treated during the secondary stage were much more apt to develop all of the subsequent accidents of the secondary period, while those energetically treated may escape them altogether or have them in a very attenuated form. Keyes asserts that a surprisingly large proportion of secondary syphilitics who are well treated have no further secondary symptoms. Thom states that a recurrent roseola is rare, but that it undoubtedly occurs. Hazen goes so far as to report that a recrudescence of secondaries either mild or severe takes place in at least 20 per cent. of all syphilitics who neglect treatment.

There is no true immunity developed in syphilis. However, from the moment the Treponema pallida enters the skin a natural defense process or resistance manifests itself. This resistance is peculiar to the disease. The primary lesion develops in three to six weeks after exposure, only to involute spontaneously

in about the same length of time. The disease is held in check for a time by a regional adenopathy. This barrier is finally broken down and a dissemination or treponemal septicemia results. Associated with this are the symptoms of the secondary period, namely, generalized adenopathy, mucous patches, roseola, etc. This disseminated stage flourishes for a time, only to be overcome in a few weeks by the development of a natural defense or resistance on the part of the body tissues to the Treponema pallida. A latent or asymptomatic period is then enjoyed by the patient for a period of a few weeks to perhaps a lifetime. When treatment which is not sufficiently intensive to check the disease is given at any time when the body is working up its own resistance to the infection, it may so upset the normal defense of the body as to produce relapses of marked intensity. The disease would undoubtedly run a more benign course had the natural defense processes of the body been unhampered by inadequate treatment. A few clinical examples may clarify this point of view.

Case I.—J. D. O. P. D. No. 78,486, age thirty-six, single. American. Chauffer. Weight 145 pounds. Reported at the clinic August 17, 1921 complaining of a rash over chest and back of one week's duration. He gave a history of having had a pea-sized ulcerating lesion on the penis two months before. It had involuted spontaneously in a month's time.

Physical examination revealed the following positive findings: The posterior pharyngeal wall was markedly injected. There was a lentil-sized superficial ulceration on the right tonsil. The superficial lymph-nodes were all enlarged. Over the entire trunk was a diffuse, mottled, macular roseola. It was most marked on the anterior trunk. There were a few indistinct areas on the upper arms. There was a pea-sized purplish scar on the left side of the shaft of the penis that was still considerably indurated. The blood Wassermann was triple plus in two antigens.

Due to the patient's employment and his inability to recognize the seriousness of his infection, treatment was given period-

ically. He received 0.4 gm. of arsphenamin on August 18th, August 25th, September 17th, and September 22d. This was followed by twelve intragluteal mercury salicylate injections, some given at weekly intervals, others four to five weeks apart.

One month after his last arsphenamin injection he developed frontal headaches of such severity that he could not sleep for four or five days in succession. On June 20, 1922 (thirteen months after his first visit) he reported with a diffuse, erythematous, maculopapular rash over the entire trunk and arms. It had been present for five weeks. There was an associated generalized adenopathy. On the right tonsil was a mucous patch in the exact location of the lesion of thirteen months before. The patient complained of general malaise.

Under fairly intensive antiluetic therapy the lesions involuted in three and a half weeks.

The second or recurrent roseola in this case was much more resistant to therapy than the one immediately following the primary infection. The inadequate treatment given did not cure the disease, but likely upset the natural defenses of the body to such an extent as to permit a recurrence of symptoms generally associated with a Treponema pallida septicemia.

At present we make it a practice to outline the course of treatment to such patients and explain to them if it is not followed out to the letter it will do them more harm than good.

Case II.—R. J. O. P. D. No. 91,924, age forty-four, male; weight 166 pounds; single. American. Laborer. Reported at the clinic October 16, 1922 complaining of general malaise, rash on the palms, and ulcers in the mouth. He gave a history of having had a neisserian infection at the age of twenty-six and thirty-three. Associated with the last infection was a venereal sore that healed in two weeks' time. A history of a recent genital sore could not be obtained.

Physical examination revealed the following positive findings: There was a pea-sized, non-indurating ulceration on the right anterior and lateral surface of tongue. It had been present for one and one-half months. The superficial lymph-nodes were

all enlarged. The heart was enlarged to the left and downward. There was a soft systolic murmur heard at the mitral area. Blood-pressure was 150 systolic and 90 diastolic. Urine contained trace of albumin and an occasional hyaline cast. There was a diffuse but ill-defined desquamating eruption on both palms. It was made up of pea-sized erythematous areas with definite borders. Due to the confluence of many of these areas the entire palm had a geographic appearance. The patient stated that about one month before he had had a rash all over the body the nature of which he was unable to describe. The lesions on the palms were the remains of this rash. His blood Wassermann was 3 plus in two antigens. His spinal fluid was serologically negative.

This was apparently a case of secondary lues without history or evidence of a primary lesion, unless we could consider the lesion on the tongue as such. Due to the cardiorenal involvement, the patient was referred to the medical clinic for examination. They looked upon the cardiorenal complex as of long duration and suggested the use of one-half doses of arsphenamin.

Accordingly, the patient was given arsphenamin 0.2 gm. at weekly intervals for six doses. At the time of the fourth injection the patient called our attention to about two dozen non-pruritic, pea-sized, slightly scaly papules csattered over the body with a tendency to grouping over the knees and elbows. There also was a piling up of material under all of the nails, with a thickening of the nail structure. The lesion on the tongue was still present and two new similar lesions had developed on the inner surface of the lower lip. Microscopic examination of a biopsy taken from one of the papules showed a diffuse infiltration of lymphocytes, round cells, and a few neutrophils. There was not much tendency to grouping of cellular elements around any particular skin structures.

Intensive arsphenamin and mercury therapy was instituted and the lesions involuted completely in three weeks' time. The urine cleared in the same length of time. This change in the urine under intensive therapy suggests that this may have

been a case of acute syphilitic nephritis. The lesions in the mouth were recurrent mucous patches. The skin eruption was of the lenticulopapular type, its character being changed by therapy. The nail changes were those occasionally associated with secondary syphilis.

In this case of secondary lues small doses of arsphenamin entirely changed the subsequent course of the disease. Injudicious therapy so upset the natural defense of the body as to permit the occurrence of many of the subsequent symptoms of the secondary period. These might have been entirely escaped had the disease been allowed to run its normal course.

CONCLUSIONS

1. Antiluetic therapy given in the secondary period which is not sufficiently intensive to check the disease may permit the recurrence.

2. In order to avoid the above experiences intensive antiluetic therapy should be encouraged, especially in cases of early lues.

CLINIC OF DR. GORDON E. HEIN

SAN FRANCISCO HOSPITAL

RHEUMATIC ENDOCARDITIS—A FEW PHASES OF ETIOLOGY AND PROGNOSIS

IN the study of the clinical course of disease either without or modified by therapeutic measures two chief methods of approach may be used: The first method depends on early and accurate diagnosis, followed by careful, frequent, and often prolonged observation of the patient until either he is cured or until he dies, and the observations made during life may be checked by the deviations from normal found at autopsy.

The second method starts with diagnosis made at autopsy, and an attempt is made to put together the story of the disease piece by piece from the history of the illness told by the individual before his demise.

Both methods have their advantages and their disadvantages. In the former the record of progress developing under careful scrutiny is necessarily more detailed. But it has been every physicians' experience at autopsy to find evidence of disease which had not been recognized during life due either to inability to correctly evaluate the various symptoms and signs, or due to the fact that they were not prominent enough for recognition at our present state of knowledge.

The recognition of endocarditis in the very beginning is still, as Bamberger stated years ago, "seldom easy, usually difficult, and often impossible." We have A. B., S. F. H. No. 44,659, as an illustration. He is a boy seventeen years of age, who first came to the San Francisco Hospital seven years ago. His family history is negative. He was born near San Francisco and has always lived in this region. He seems to be susceptible to contagious diseases, for he has had measles, mumps, chickenpox and whooping-cough in childhood. During the first ten years of his life he had sore throat frequently. At the age of

ten years, in the course of a routine examination of school children, he was advised to have his tonsils removed because they were enlarged. Tonsils and adenoids were removed. However, this did not prevent further disease in the upper respiratory tract, for four and a half years later, one year prior to the admission in 1920, he had a "cold and cough" lasting nine months. He was admitted in 1920 after he had had a "cold" for three weeks. One evening a few days prior to entrance he had had a chill. On awakening the following day joint pain appeared first in the right knee and ankle, later in the left knee and ankle, and finally in the right elbow. With the appearance of inflammation of the joints he began sweating. At that examination he was thin and pale. He had a narrow nose, narrow maxilla, and a high arched palate. The nose contained several small ulcers. Several carious teeth were present. The tonsils had been removed. The cervical glands were small but palpable. The lungs were negative. The heart was rapid, but was not enlarged. The tones were normal except that the first sound at the apex may have been louder than normal. No murmurs could be discerned. Liver and spleen were not palpable. The joints were those of rheumatic fever. His temperature was 101° F., becoming normal on the fifth day and remaining so. The pulse-rate was 100, dropping with temperature to from 70 to 80. R. B. C. 4,344,000, with a hemoglobin of 75 per cent. W. B. C. 14,400, with 65 per cent. Pmn., S. L. 33 per cent.; L. L. 1 per cent., and T. 1 per cent. No evidence of cardiac damage was noted and he was discharged as a case of rheumatic fever which had been cured.

He remained well for approximately two years. On August 12, 1922 he was readmitted to the hospital with pain in the knees and right ankle which had begun one week before. Pain was also present in the right side at the level of the twelfth rib when he was in the sitting posture.

The patient was not as ill appearing as at the previous admission, but now showed definite evidence of cardiac involvement. A marked pulsation was present over the entire precordium. The heart was enlarged to the left. A loud systolic murmur

was present with the point of maximum intensity at the apex, but heard almost as well in the pulmonic area. No presystolic murmur could be heard even with the boy on his left side. The first sound at the apex was snapping, similar to its character at the previous examination. P_2 was greater than A_2. Blood-pressure 100/60. His fingers were not clubbed nor was the spleen palpable. Both shoulders, elbows, and knees were painful, but showed no redness, heat, or swelling. The wrists were hot, tender, and had a faint pink tinge. No nodules, nodes, or petechiæ were noted. The second day after admission he had a distinct gallop rhythm, which disappeared, to reappear at various times during this stay. His fever on admission was low, 99° F., but gradually went up to 102° F., receded, rose again, but to a lower level, finally receding to 99° F., where it remained for three months before it stayed at the normal level. This time his pulse was relatively rapid, ranging between 90 and 100, with temperature of 99° F., and with the elevation of the temperature to 102° F. rising to 150.

Eighteen days after admission he had signs of fluid in both pleural cavities which slowly disappeared. He had reached the stage where he was allowed up in a chair when, in the course of a mild epidemic, he developed an attack of influenza which lasted six days, following which his pulse has been slightly more rapid and has caused his remaining in bed.

His anemia on admission this time was more marked, 3,580,000 with hemoglobin 55 per cent. compared to 4,344,000 and 75 per cent. hemoglobin before. The W. B. C. were 14,200, with a differential count similar to the previous one. The blood-cultures were negative at different times during his hospital course.

When did the original infection of his heart occur? Was the tonsillitis a focus from which repeated damage to the heart took place throughout the first ten years of life? The removal of tonsils and adenoids had very little effect in preventing either subsequent rheumatic fever or disease of the heart. However, do not underestimate the close connection between tonsillitis, chorea, rheumatic fever, and cardiac disease.

St. Lawrence found in 42 patients with rheumatic fever that following tonsillectomy no recurrence took place in 84 per cent. Of 40 cases of chorea, 50 per cent. had no recurrence after tonsil enucleation. He concluded that "tonsillectomy would seem to be the most important measure at present available for the prevention of acute rheumatic fever." The average length of time he followed these patients was three and a half years, and none were observed for less than two years.

Lambert studied the histories of 1000 patients with rheumatic fever and 1000 patients with pneumonia, and found the incidence of tonsillitis definitely higher in the people with rheumatic fever. Approximately 87 per cent. of 250 children with endocarditis were found by Ledford to give a history of rheumatic fever, chorea, or tonsillitis. Stephen McKenzie found that 71 per cent. of 116 children had endocarditis after three attacks of rheumatic fever.

I believe that if ordinary infections of the upper respiratory passages could be studied more carefully cases of cardiac disease often unsuspected would be found. I remember a school teacher who had sore throat, not severe enough to confine her to bed, in whom no other clinical evidence of cardiac disease could be elicited, who showed latent block. The As–Vs interval returned to within normal limits with the disappearance of the sore throat. She refused to have her tonsils removed. Six months later she returned, with slight dyspnea on exertion, definite cardiac enlargement, and many premature beats which were extremely annoying.

Latent block, which Lewis and others consider definite evidence of myocardial involvement, is found fairly frequently in certain acute infections where other evidence of myocarditis is not noted. In 50 consecutive cases of acute rheumatic fever studied by Parkinson, Gosse and Gunson, prolonged As–Vs conduction was present in 30 per cent. It occurred in some cases without pyrexia or tachycardia. Of the 50 patients, sore throat accompanied the attack in 16, and 30 of the 50 showed enlarged tonsils.

But, as in the present case, the removal of the tonsils, even

though diseased, may not prevent further damage, but this should not justify leaving them in.

The involvement of the heart may have occurred before tonsillectomy—we have no proof that it did. It may have occurred two years ago or the onset may have been during the present attack. It may be noted that the first tone at the apex was considered accentuated by several different observers two years ago, but no confirmatory evidence could be obtained, while the prompt recovery and two years of health rather suggest that no involvement occurred. An electrocardiogram may have helped out at that time in revealing a latent block otherwise not recognizable.

At present the patient has myocarditis and endocarditis, probably chiefly involving the mitral valve. What will become of him?

He now has no more fever or joint inflammation. He recovered promptly from an attack of influenza which affected him in a manner similar to people without endocarditis. Still rheumatic fever is prone to recur and his previous history shows that he is susceptible to infection. That this susceptibility persists is shown by the second attack of rheumatic fever and his more recent influenza. His heart muscle is damaged. The heart is enlarged and is persistently rapid while he is quiet in bed and without fever. He is not yet at a stage where functional tests, which in the main are not particularly satisfactory, may be applied. All foci of infection as far as can be discovered have been removed.

He is a County Hospital case. He will have to work to be able to exist, and his mentality is such that it will probably be physical rather than mental work. A public school teacher is in the wards, but he shows little inclination toward study. The preparation of children with heart disease for a definite part in life so that they may be self-supporting is one of the greatest problems in the treatment of cardiac disease. The fact that he is a male is not in his favor. Man, generally speaking, has the harder physical task in daily life. He is seventeen years of age. Below ten years the prognosis is not so good.

How long do patients who have had rheumatic endocarditis live? To answer this is impossible. It depends on too many factors. The severity of the infection, the involvement of the myocardium and pericardium, the complications and subsequent infection, the position in the social scale with necessity for work, the mental ability to be able to care for one's self, and innumerable other factors must be considered. We have recently been examining the histories of patients with endocarditis found at autopsy. We have tried to exclude terminal infections and take only cases which have shown pathologic evidence of previous endocarditis. The series is as yet too small for any deductions, but it is interesting to note that often no history of the endocarditis was obtained, and second, that the ages were, as a whole, more advanced than would ordinarily be expected. The consecutive ages of the first 15 studied were seventy-six, sixty-six, fifty-three, fifty-seven, thirty-one, sixty-five, sixty-two, forty, forty-five, thirty, fifty-one, sixty, twenty-four, fifty-one, and sixty-five, or an average of almost fifty-two years. These people belong to the same stratum as our patient, and, as a whole, their habits of life must have been similar. Of course, each individual case has to be judged by its own peculiar characteristics. Nevertheless, it seems as if the outlook be not so discouraging.

Complications may alter the prognosis. The close relation between acute ulcerative endocarditis and rheumatic fever has long been known, and it has not been proved that the simple endocarditis of rheumatic fever does not progress to the ulcerative form. Poynton, after a study of 2000 postmortem examinations on adults, feels that "more rheumatic patients die from malignant endocarditis than from acute rheumatic carditis such as occurs in children." Subacute bacterial endocarditis may supervene. Libman recently states that "subacute bacterial endocarditis occurs almost always on the basis of a previously damaged valve." "It involves most frequently valves previously affected by rheumatic fever." At present no evidence of the existence of subacute bacterial endocarditis is present in this boy. His anemia is not progressive, he has had no petechiæ

around the root of his neck, in the conjunctivæ, in retina or elsewhere, he has had no palpable spleen, no clubbing of the fingers, no nodes, no red blood-cells in his urine, and his blood-cultures have been negative. With his damaged valve he is more likely to develop bacterial endocarditis than a person in whom no damage to the valves has occurred.

Another frequent complication which shows its effect relatively late is adhesive pericarditis. F. J. Poynton feels that the pericardium is more or less damaged in at least 90 per cent. of fatal cases of rheumatic heart disease.

So far we have had nothing on which to base a diagnosis of pericarditis in our patient. Undoubtedly, the greatest danger facing him is subsequent infection, either repeated attacks of rheumatic fever and more particularly by the organisms of bacterial endocarditis, acute or subacute. By keeping him until we are sure no more smoldering infection is present in the endocardium or myocardium, by removal of foci of infection, to try to close the portals of entry for such bacteria, and by educating him to avoid undue exposure, we are best able to help him to a useful happy life, at least for a while. His life will probably be shortened. It may be shortened markedly, but he need not know this. The restrictions placed on him should not be too many or too severe. They should not make of him a cardiac invalid or neurasthenic. As Barringer has pointed out, infection is probably a greater factor in producing cardiac failure than is strain. Of 154 cases of cardiac failure studied by him, only 7 gave a history of strain, physical in 5, mental in 2. On the other hand, evidence of infection was present in the majority and 117 of the 154 showed fever. Strenuous exercise and work, of course, should be forbidden, but by most cardiac patients it is not indulged in any way. The error of trying to restrict their efforts too much is probably often as harmful as allowing them too much freedom. After all, is it better to have lived a long life as an invalid prevented from doing the things we desire to do, or to die a short time sooner having had the satisfaction of a more active and unrestricted existence?

CLINIC OF DR. JOSEPH CATTON

NEUROPSYCHIATRIC DIVISION, STANFORD UNIVERSITY MEDICAL SCHOOL

PSYCHOTHERAPY OF POSTTRAUMATIC NEUROSES: LUMP-SUM SETTLEMENT

THIS clinic will concern itself with posttraumatic neuroses. It would define posttraumatic neuroses as conditions made up of hysteric, or neurasthenic, or psychasthenic, or hypochrondriacal symptoms, either alone or in varying combination, the symptoms appearing to have resulted from physical injury, and not necessarily being accompanied by any demonstrable organic disease to which they might be with certainty ascribed.

Psychoneuroses of similar types may be seen regardless of the nature of their causation. Neuroses following head trauma, for example, may not differ from nervous upsets due to other causes. Further, given a head injury, with or without demonstrable organic brain injury, similar psychoneurotic conditions may be present.

Posttraumatic neuroses develop in certain persons who meet with bodily injury, more especially when the cranium or vertebral column has been traumatized. If some other person, an insurance carrier, a corporation, or industry be liable for the accident, quite frequently the disease picture will include a disordered psychology related to compensation, damages, and litigation.

One of the weapons used to combat these neuroses is what is termed "lump-sum settlement." It is one of the psychologic therapies aimed at cure; at readjustment of the injured person to his place in industry and society; and a just treatment of all interested parties. It contemplates the payment of a lump-sum

of money, and a definite and final termination of the case so far as its litigation phases are concerned. It has been inelegantly, but perhaps appropriately, termed the "gold cure."

Is there a stage in the progress of a posttraumatic neurosis when lump-sum settlement may reasonably be expected to offer hope of immediate or fairly rapid cure? The physician's answer to this question depends in a great degree on whether he belongs to the psychologic or organic school. With the psychologic attitude may come a strong bias in favor of lump-sum settlement; with the organic attitude may come great hesitation to recommend it.

PSYCHOLOGIC ATTITUDE

The physician who sees in posttraumatic neuroses a disordered psychology and nothing more thinks somewhat as follows: No signs of organic disease are present in this case. Traumatic and non-traumatic neuroses, both in war and peace, have shown similar symptoms and similar psychologic causative mechanism. For example, in war, with or without actual physical trauma, exposure, exhaustion, and the like soon become associated with very potent self-preservation phenomena, and mental mechanisms were set in motion which tended to remove the soldier from the field of battle. Responsibilities, ethical standards, social level, and other phenomena helped determine the persons affected and the type of neuroses. In this matter at times officers were affected more often than their men. Prisoners exposed to the same shell fire as troops developed neuroses with much less incidence. Great injuries to the nervous system were not accompanied by these pictures. The great majority of these cases could be cured very quickly by psychotherapy. Sieges, earthquakes, lightning, floods—all these, by introducing psychical and not physical injury, have led to the development of neuroses not different from those related to physical trauma. Under all conditions it seems that the so-called functional pictures are more frequent the less the physical damage.

In connection with personal injury suits and claims because of industrial accidents, similar observations have been made. Similar psychologic mechanisms are early set in motion to pro-

long the comfort, compensation, etc., which have obtained on removal from work. The person shaken up in a railroad wreck and sustaining a slight jarring of the cranium is laid up a few days; then come sympathy of wife and friends, and self-pity; being away from work or business; suggestions of himself and others that he has something coming to him; examinations by his own physician and specialists; increase in symptoms; introspection, worry, and anxiety; income stopped, bills coming in, uncertainty as to outcome of things; engagement of attorney; ideas of large damages; more medical examinations on behalf of liable parties; appearances before courts or commissions; contradictory medical testimony heard by the injured man; doubt as to the nature of his illness—all these help develop and fix the neurosis. In all injuries with liability aspects these phenomena may obtain; in industrial injuries the compensation factor comes in by law within a short time (that is, in many countries and states). Then added to the other factors mentioned the man has 65 per cent. more or less of his pay, no need to work, and possibly the feeling that he is not being treated entirely fairly.

The medical man with the psychologic glasses sees all these phenomena. He notes that where compensation and litigation features have not entered there did not seem to be any such great disease picture; no such inability to deal with the case by the usual methods of psychotherapy. He thinks of gross brain and cord injuries and no psychoneuroses; of severe brain concussion in footballers and others, and no psychoneuroses. He says experience teaches that hysterics cannot be cured while litigation is on. Note that where the system of continuing award is used, as a policy, as in Germany, and in other places less constantly, the neuroses have a longer course. He states that all authorities are agreed that functional disturbances are far more frequent, and they are made worse with medico-legal complications. Yes, and he says, if compensation and litigation are the only new factors in posttraumatic neuroses, as contrasted with other neuroses, then let these new factors be dealt with. And so is born the method of removal of the compensation

factor by the payment of a lump sum of money and of the litigation factors by the closing of this aspect of the case. And, as the proof that the method is a correct one, the experience of cures is advanced. The reports of cure will be considered after the organic school has stated its case.

ORGANIC ATTITUDE

The organic school thinks that psychologic factors do not entirely explain the disease pictures known as posttraumatic neuroses. True, no signs of organic disease may be apparent in these cases. No signs of organic disease, as measured by present diagnostic methods. It is not so long, however, since reflexes, as they are now known, were not among the diagnostic aids. The neuron theory is younger than many who read this clinic. Today, with increased knowledge, one can localize the pathology of certain disease pictures, in the cerebrum or cord, when yesterday the syndromes were considered functional. One by one functional diseases have left that class and joined the ever-increasing class of organic disease pictures definitely localized.

Fatal cases of accidents have before death shown negative findings as to organic neurologic disease, and postmortem there have been found small hemorrhages scattered through the nervous system; the brain, cord, and meninges have shared in the distribution of these lesions and subsequent softenings. Microscopic and staining alterations as well have been present in these cases. Mott's work is typical of that of numerous others in this regard. Experimentally, animals have been subjected to head injury, and to spinning in the centrifuge, and have shown no external physical injury, but postmortem changes in the central nervous system have been found. Only yesterday one accepted as part of the picture of hysteria large groups of symptoms and signs, which, as evidenced in the work of Babinski and Froment, are beginning to be considered organic. These "organic" men say, "after all, what is known of cerebral localization?" "What are the pathognomonic signs of multiple small hemorrhages throughout the brain substance?" What are the pathogno-

monic signs of a larger hemorrhage or other lesion over or involving the so-called silent areas of the brain? Can certain definite organic lesions in relation to portions of the frontal lobes, or the inferior outer portions of the temporal lobes, or certain portions of the parietal lobes be recognized by present diagnostic methods? And if one be unable to demonstrate organic lesions of a greater or lesser degree in these large areas of brain, yes, in one-third of the cortical brain area, and much of the more central brain, then can one deny the presence of these lesions? The organic school says emphatically that one must not negate the presence of pathology which he has not prepared himself to see. And the operating-room and post-mortem room bear out these contentions. Surprising pathologies are here unearthed, with or without the microscope, which pathologies have not been recognized before death by usual clinic methods. So the medical man of the organic school puts on his glasses—his are for near vision—the psychologist's were for far vision. With these near vision glasses he searches for organic change, and when he does not find it he feels his glasses are not strong enough. He recognizes the hosts of psychologic factors present, and would deal with them much in the manner of the psychologic school. He balks at the one psychologic method which is being considered. He does not feel that the payment of a lump sum of money and termination of a given case will affect a cure; rather, he does not wish to recommend the same as the best method of handling the case. He feels, with Cushing, that since cerebral injury can produce the symptoms or since lack of ability to localize pathology does not mean there is no danger, how can it be arbitrarily stated that there is no organic basis? Or with Babinski, how is it possible to find the true cause of symptoms when their appearance is the same whether they are organic or functional? And so he confesses that pathology of an organic sort is more than possible, it is probable; time only may effect a cure; he can only prognosticate an indefinite period of disability; the patient needs further observation and treatment. He votes "no" on lump-sum settlement.

It is unfortunate that the psychologic school should use only its far vision glasses and the organic school those for near vision. Unfortunate that each school would not combine both pairs of spectacles into one pair with bifocal lenses. And this because it is altogether probable that following injury both psychogenic and somatogenic factors are present as bases of disability.

In one case the psychogenic factors may be in the ascendency, in another the somatogenic factors.

At this point, two statements may be submitted as of fact:

1. The psychologic school must accept the following as it stands: *Present diagnostic methods fail to reveal clinically certain cerebrospinal pathologies which are apparent through operation or autopsy.*

2. The organic school should not hesitate to accept the following: *Psychologic treatment alone, for example, by the method of lump-sum settlement, is entirely sufficient in a large number of appropriate cases to effect a cure of posttraumatic neurosis.*

Consider that a case presents itself. The patient has met with a head injury; there was a short period of unconsciousness; then confinement to bed for a few days. He has presented a usual picture following head injury, namely, headache, dizziness, irritability, insomnia, asthenia, etc. He and his wife feel that he has become an entirely different man. He has been treated over a period of a year by various and changing physicians. There has been much of investigation, and considerable duplication of the same. He has tried to work and has found his symptoms made worse. He has come to think that in view of the differing opinions of the medical men he must have some unknown or very unusual injury, and so he doubts that he may ever be well. He has been receiving compensation on the basis of total disability. He feels that he needs medical attention for an indefinite period. As regards compensation, he would like an award with indefinite continuance of total disability, or a very substantial settlement in a lump sum, without final closure of the case. He has probably secured counsel to represent him. All the medical men who have seen the case are in agreement

on the following: there has at no time been present a single sign of organic neurologic disease. All the observers are agreed that the man met with a brain concussion and that he now presents a picture of posttraumatic neurosis. What shall be done with the case?

The physician of the psychologic school, because of his attitude developed through the considerations given earlier in this clinic, recommends termination of the case and the payment of a few hundred dollars in a lump sum. He feels safe in making this recommendation, because in his experience this method of handling has appeared to bring about cure of such cases. He quotes Dercum as stating that this is also the universal experience. He thinks that, regardless of the treatment offered the patient, he will neither get well nor improve while a claim remains unsettled or while there is hope of more compensation. Morselli has found that cure is brought about by settlement or promise of same. Naegeli had checked up 138 settled cases and found no serious impairment of earning power. Dye's experience is reported as similar. Boone found 95 per cent. of claimants fully recovered after claims had been disposed of. Further, regardless of all other differences in opinion concerning posttraumatic neuroses, it has been recognized by nearly all observers that litigation features are harmful and should be removed. Bailey has carefully considered the work of such men as the observers mentioned, and has reported 14 personal cases in detail. Of the 14, considerably over half were cured, others were helped, and in only 2 did the condition remain unchanged. Dercum states that with experience in handling this type of case comes courage and confidence to dispose of them by the method of settlement and termination. In his thirty years of experience and reporting 447 cases (in 1916) he stated that he had not one case report for treatment after it had been settled or litigation otherwise disposed of. He reviews how as a young man he used to testify that these patients needed prolonged treatment and might never be well. His later experience was that settled cases rarely if ever sought further treatment.

Now the physician of the organic school considers recom-

mendations in the case cited. He thinks somewhat as follows: The patient received a definite brain concussion; whatever else of damage to the brain tissue may be present is not apparent. He has in mind the long list of considerations mentioned earlier in the clinic, which have created the organic attitude; particularly the inability to diagnose certain more or less gross organic cerebrospinal pathology. He says the patient has had a definite injury; the complaints could well be due to brain injury; the accident was sufficient as a cause of brain damage; he therefore is not in a position to say that there is no brain damage and that the complaints rest on a psychologic basis alone. To him the prognosis as to disability is indefinite, and he thinks it neither good medicine nor an equitable handling of the case to stop treatment and compensation and try to force the man back to his place in industry and society. And, dealing with the psychologic aspects of the case, he can quote the very men who have advocated lump-sum settlement, to the effect that different types of these neurotic pictures have different prognoses. For example, Bailey states, in effect, that while neurasthenic patients in most cases return to work and hysteric manifestations may vanish, leaving the patient apparently well, nevertheless those patients who present mixed and unclassified forms are only occasionally able to resume all the duties which the disorder obliged them to lay aside. And he sees the uncured cases. He remembers that there are accident cases in which compensation does not enter, and which symptoms are present over a period of years. He wonders, with others, whether a neurasthenic state or psychoneurotic picture, which follows trauma, does not leave a scar on the less conscious, if not the conscious, personality. Especially where the symptoms have been present for months or a year or two, he has the support of most observers that the prognosis becomes more and more uncertain. He may feel that physicians who have been examiners for corporations or insurance companies focus on the cases of miraculous cure by the settlement method, and forget the very great number of cases which had other types of treatment and their after-histories.

On the adjustment of a claim and the supposed termination

of a case the patient may disappear from sight, and it would be very difficult to ascertain whether or not his mental and nervous symptoms do actually disappear. While it might be inferred that the troubles are over, in how many cases, after all, can definite information be secured? Certain corporation records of this type are available; those of the London and Northwestern Railroad of England would indicate cures in over one-half of the cases. But how about the other 30 to 40 per cent.?

As one reviews the attitudes of the two groups in their consideration of a given case of posttraumatic neurosis, the differences in opinion and not the agreements in opinion stand out boldly. And if the matter is carried no further the problem seems hopeless. Things remain unsettled and in the state which has obtained from the time neuropsychiatric pictures were recognized as following trauma.

I submit that there are particulars concerning which all observers must find themselves in agreement:

1. Present diagnostic methods fail to reveal, clinically, certain cerebrospinal pathologies, which become apparent through operation and autopsy.

2. In a large number of selected cases psychologic treatment alone, for example, by the method of lump-sum settlement and closure, is entirely sufficient to effect a cure of posttraumatic neuroses.

3. Diagnostic criteria must be developed to enable the decision in certain cases that such organic pathology as may be present is, to all intents and purposes, non-disabling, and that the causative psychopathology in the case might be removed by lump-sum settlement.

It would seem that those who belong to the organic school must make the move. If careful neuropsychiatric investigation would seem to indicate lump-sum settlement as a procedure of choice, then the possible existence of non-demonstrable organic neuropathology should not stand in the way.

The whole question then would seem to resolve itself into the listing of a set of diagnostic criteria which would be indicative of a minimum amount of disability from organic pathology,

and a maximum, necessary, and essential amount of psychopathology, correctable by settlement and termination of a case. Each physician has in him something of the attitude of the psychogenic school and, likewise, of the organic school; each feels after a period of contact with a given case that, considering the case as a whole, lump-sum settlement is or is not indicated. This intuitive arrival at decisions may be safe in the case of some physicians, dangerous in the case of others. In order that the greatest number of correct recommendations from the greatest number of physicians may obtain, it would seem that diagnoses and recommendations should rest on the satisfaction of certain criteria, and not on the "feeling with regard to the case."

In spite of the wishes of the writer that a list of definite diagnostic criteria of the type mentioned might be included toward the end of the clinic, it must be stated that consideration of his own short experience, consultations with confrères, and some study of the literature has given little if any help. Rather than stating the criteria themselves, it must be indicated that they lie in the future of scientific medical progress. Today a given set of neuropsychiatric phenomena, as in the posttraumatic neuroses, may as well be present, in the presence or absence of demonstrable organic disease. There is no agreement as to symptoms and signs pathognomonic of multiple small hemorrhages through the central nervous structures. Nor of grosser lesions, in areas of brain, which because of lack of knowledge of their function, are termed "silent areas." A differential symptomatology as between psychopathology and minute organic neuropathology must be developed; similarly between psychopathology and more or less gross organic change in the "silent" regions of brain, spinal cord, and autonomic system. The significance of vasomotor and other autonomic symptoms and signs accompanying psychoneurotic pictures must be ascertained. There must be careful follow-up to determine whether settled cases are improved or cured.

While these investigations are suggested for the future, the problem must be dealt with in the present. To that end the following suggestions are advanced as possible helps:

1. Neuropsychiatric investigation should be undertaken in accident cases, as soon after accident as possible, as follows:

(*a*) In all cases of injury to cranium or vertebral column.

(*b*) When attending physician has felt he was dealing with a neurotic, a malingerer, an exaggerator, or a person presenting any nervous or mental condition.

(*c*) When it has been learned that the patient is drawing compensation, benefit, or pension from more than one source.

(*d*) When patient is a repeater as regards accidents of a disabling character.

2. The neuropsychiatric investigation should be most complete and should stress the study of the man's personality, his ancestry, previous mental and nervous history, industrial history; also conditions of labor, union and non-union, home conditions, and general environmental phenomena. These investigations should lead to the accumulation of definite data which will help toward recommendations, and which would replace the necessity of deciding a case because of one's "feeling regarding the patient."

3. If investigations lead to a diagnosis of posttraumatic neurosis as defined in this communication, then the following should be considered: The neuropsychiatrist making the diagnosis will likely have either the psychologic bias toward settlement or the organic bias toward an indefinite period of treatment. But the type of case itself and not the observer to whom the patient is sent should determine the recommendation. And to relieve the matter from the possibility and probability of arbitrary decision the next suggestion is offered.

4. (*a*) In personal injury suits before courts of law: The Judge should submit a panel of neuropsychiatrists from which court, prosecution, and defense would each choose an examiner. The consultation report of these examiners should be the only medical evidence furnished the court and jury.

(*b*) In industrial accident cases: The Industrial Accident Commission should present a panel of neuropsychiatrists from which the patient, the carrier, and the commission should each choose one. These men should sit in consultation and their

findings and recommendations as to lump-sum settlement and all other medical data should be considered the only and the final findings of medical fact.

These consultations will give a pooled opinion which will tend to be more nearly exact than any single opinion. The opinion will tend to be as exact as present knowledge of the subject will permit. Our understanding of these matters, however, is, as has been pointed out, woefully insufficient, and only persistent research along the lines already indicated will improve matters.

This clinic has attempted an exposition of attitudes concerning posttraumatic neuroses; it has been somewhat a confession of our ignorance; it urges that consultation opinions will tend to express agreement rather than disagreement; it indicates the necessity of research to broaden our understanding of the nature and mechanism of posttraumatic neuroses. The closing of this clinic will indicate in a brief manner the writer's method of handling certain of the cases deemed suitable for lump-sum settlement.

THE METHOD OF TREATMENT BY LUMP-SUM SETTLEMENT

The case of head injury with unconsciousness and then neurotic picture has been studied and the entire record of same has been thought to have negligible if any organic damage, and to have a definite psychologic basis which seems amenable to the lum-sum treatment. There have been no positive signs of organic damage, *i. e.*, early or late localizing signs of trouble in motor, sensory, or reflex systems; positive fundus findings; increased spinal fluid pressure, or blood or other pathologic findings in spinal fluid; persistent slow pulse postdating head injury. Further, while the symptom picture is marked, there is sufficient antecedent neurotic history to make it unnecessary to presume the presence of some undemonstrable organic lesion. There is a bad family tree; psychoneurotic past history as measured by the patient's reactions to stresses and strains; there is some conscious or unconscious exaggeration of symptoms; resistance to return to work; marked autonomic—*e. g.*, vasomotor—

disturbances; discovery by various methods of mental analysis, of disturbances related to instinctive processes, for example, self-preservation, sex, etc. Further, the functional psychoneurosis diagnosis has not simply been a negative one by the exclusion of an organic diagnosis; the psychoneurosis has been indicated by the effect of suggestion in the changing, removing, or adding symptoms to the disease picture.

Make a fresh start with the patient when he comes under your attention. He must not be given the idea that any antecedent observation, opinion, or treatment has been in error, but rather that at the present time consultation, pooling of all data, and new findings have caused an agreement of the doctors as to the nature of his illness and the indicated treatment. Take the patient into your confidence on as many angles of his case as possible; give him no information, however, which will cause him to react against a previous medical examiner or advisor, the insurance carrier, the commission, or court. Give him, however, every bit of information which will let him know that all parties concerned are working toward the proper solution of his difficulties. That all wish him to be restored to his former health and to be properly compensated by liable parties.

He should next be informed of the absolute agreement of all the medical examiners that there is no definite organic disability present. The patient may be given an explanation of the difference between organic and functional disturbance as follows: Explain that his trouble is not imaginary, that it is actual, definite and real, and has a basis which you will tell him of in a moment. Explain to him that a patient with a normal stomach might eat a large meal with no particular distress; that a patient with an organic disease of his stomach, for example, an ulcer, might, following the eating of the same type of meal, be sick to his stomach, have pain, and vomit. Now ask the patient to assume that he is the man with the normal stomach, and that he has eaten most of the meal, and that suddenly the door is opened and he is asked to look upon the mangled form of his child just run down by a street car. No further explanation is usually necessary for him to understand that he might have very real

stomach symptoms from nervous causes, and still his stomach have no disease or injury of any type. Now, it may be explained that this type of trouble is just as real, just as annoying, just as disabling as any other type of trouble, and that treatment is required. He can be made to see that his nervous system is behaving in a manner similar to the stomach of the story.

Now since we know the exact basis for his troubles, we know also how to treat him. He is going to need time; certain medical and other treatment; and special nervous treatment. Explain to him that he has heard many times the expression "the straw that broke the camel's back"; in other words, that each little burden added to the weight he has to carry at this time may be a factor in keeping him ill, and that accordingly not only will you have to treat the results of the injury, but you will have to treat the whole man. So, the detailed questioning through which you will put him during your visits will be only in order to relieve each and every source of "strain" to his nervous system.

Inform your patient that you feel that his treatment at your hands will last about so many days or weeks. In suitable cases it may be advisable to have a short period, say of a week to ten days, of intensive psychotherapy. The latter in many cases should be undertaken in isolation; that is, in private room, with patient confined to bed, with his whole day organized, and with no visitors, no reading matter, no smoking, etc. The psychotherapy during this period may take the form of strong suggestions by word of mouth, by drugs, or by certain physical therapy. Following this initial period there should be further treatment by suggestion, by re-education, by mental catharsis, by mental analyses, and explanations and encouragement.

Anticipating the date of the patient's discharge from further medical treatment, he should be informed that it is your belief that in "n" more weeks, or on about —— 1, 1923 you are going to put a certain matter up to him for decision; that you believe that after —— 1, 1923 he will get well equally quickly in either of two ways: First he may continue your treatments, and continue to receive compensation for a period of two to "n"

months. Second, he may discontinue regular treatment at your hands, and carry out a régime which you will suggest for a similar period of two to "n" months. The latter régime should be given in detail and should include a change of scene. Tell him of your confidence that this period of time will lead to his recovery by either one of the routes. Now add, that if he chooses the second plan, you will urge the liable parties to give him the compensation for the two to "n" months in a lump sum rather than in small payments.[1] Further, that you will recommend that a second sum of money be set aside for further medical attention, for, while you believe no further treatment will be necessary, it is only fair that the patient should have some funds with which to secure medical treatment, if *he* should think it necessary. The best plan is to have this latter sum of money placed in your hands and to inform the patient that at such time as he feels further medical treatment is unnecessary he may have the balance which remains.

[1] This phase of lump-sum settlement has been used by the writer in certain of his cases, but it is felt that Dr. Walter Schaller should have the credit for definitely working out this feature of the method.

CLINIC OF DR. MARSHALL C. CHENEY

UNIVERSITY OF CALIFORNIA HOSPITAL

THE TECHNIC OF STOOL EXAMINATION

I WISH to discuss what is worth while in the testing of feces, and to urge a change to more productive procedures. Because the tests that have been in vogue yield so little information of value very few physicians can be found who make a routine examination of the stool. Even specialists in gastro-enterology attempt a diagnosis without a single observation of the feces. In this way certain disabling diseases and others that produce greater or less degrees of chronic ill health are not even suspected, because the active agent is present in the stool only and absolute diagnosis dependent upon an intelligent search for the evidence. Once the focus of attention is shifted from relatively unimportant details to the really useful tests, routine examination of the stool will take a position comparable in importance with blood and urine tests.

By far the most important purpose of stool examination is the absolute diagnosis of worm and protozoan infections of the intestine. Abundant evidence of the prevalence of these diseases has been reported from many sources. They form a small but definite percentage of the cases seen in any general practice. Tapeworm infection and acute amebic dysentery are fairly easily diagnosed. But how few are discovering hookworm, ascaris, strongyloides, chronic amebic dysentery, giardia, chilomastix, trichomonas, Balantidium coli, and spirochetes These and less common parasites are being overlooked to the detriment of the patient. Now that the characteristics of amebic and flagellate cysts are sufficiently well known, so that absolute diagnosis can be made from them, even in the absence of the active parasite, the technic

of stool examination must include methods for the differentiation of these forms. This is quite essential in temperate climates where chronic and carrier cases are much more common than the acute types.

Second in importance in the examination of feces is the detection of mucus, epithelium, pus, or fresh blood. All are evidence of an abnormal condition within the intestine which requires further investigation. The finding may be simply mucus with adherent epithelial cells, as in the external coat so often found on constipated stools, or it may be pus and fresh blood which mean ulceration of the rectum or colon, as in carcinoma, syphilis, tuberculosis, typhoid fever, bacillary and amebic dysentery, Balantidium coli infection, etc. Sometimes hemorrhoids, menstrual contamination, or admixture of urine containing blood or pus is the source of the abnormal elements in the stool, but whatever their derivation, they should be detected when present. An error, common to beginners, is to mistake the yeasts, present in every specimen, for red blood-corpuscles, and to build up a diagnosis on the basis of the supposed finding. Several months of practice is the best antidote for the grosser mistakes.

Food residues have received too much attention in the past. Only rarely can anything of value be learned from their study, even after a test diet of the type that clutters up most of the manuals. Meat fibers are the objects of undeserved attention in most reports. They may be absent, not due to complete digestion, but usually because the patient subscribes to the popular belief that meat is harmful, and so abstains. Enormous numbers of fibers may be present in the stool after a meal rich in meat. The important point is whether they are digested or not. Normally, all that is found is the familiar short yellow piece in which the striations are faint or absent. The true "pancreatic" stool containing numerous long fibers with clear striations and intact nuclei is exceedingly rare, in fact, was encountered only once by me in 950 cases of all sorts. Excess of fat, fatty acids, or soap is evident in the smear at a glance without resort to stain and, in the adult, is uncommon. Castor oil and "mineral oil" are the usual findings. Much has been

written of starch indigestion, but undigested starch is nevertheless a rare finding in the stool of adults. Vegetable residues are really important because they may closely resemble the ova or larvæ of worms, amebæ or their cysts, or the cysts of flagellates. The presence of chlorophyl in the envelope, unusual size, a "dead" look due to the wear and tear of digestion, or the discovery of clumps of cells will usually differentiate them from the perfect contours, characteristic structure, uniform size, and "live" appearance of ova, larvæ, cysts, and amebæ. Many stools contain plant hairs which may easily be mistaken for larval worms. The rule of Dr. E. L. Walker that "if they do not move, they are not worms" is a safe one to follow. For the great majority of specimens the simple statement "food residues normal" is sufficient attention to this portion of the stool.

In spite of the many possible sources of occult blood in the stool, much store is set upon positive results of guaiac and benzidin tests as indicating ulcer or carcinoma somewhere in the gastro-intestinal tract. The bleeding from ulcer or carcinoma is usually so massive that the stool is black and the diagnosis obvious, without performing any tests. However, a negative benzidin reaction is of real value, as it rules out all the sources of occult blood.

All the remaining tests of feces do not properly belong to the routine and should be utilized only when indicated. Among these, permanent stains for the differentiation of protozoan parasites, concentration tests for ova, cultures for bacteria, wild yeasts and molds, and Gram stains of the flora, are the most useful. With these general principles in mind, a practical routine can be constructed.

The first essential of a satisfactory routine is a simple method of collecting and handling the specimen. Since diagnosis from the cyst forms has become as accurate as from the active parasite, it is no longer necessary to give salts to get a liquid stool, or to place the same in an incubator. This alone relieves the patient and nurse of considerable nuisance and makes the physician more willing to make stool tests a routine instead of restricting the examination to as few cases as possible. A small portion

(2 x 3 cm.) from the softest part of the stool as ordinarily passed is sufficient for routine examination. The important point, which cannot be emphasized too much, is to *examine the specimen while fresh.* Laxness in this defeats diagnosis more often than any other break in the technic. A slide, cover-slip, and microscope are sufficient equipment if the above rule is followed. Active amebæ, flagellates, Balantidium coli, strongyloides larvæ, spirochetes, and pin-worms cannot be found in old stools because they die and disintegrate. Moreover, molds grow rapidly in fecal material and complicate the findings in the smear. Furthermore, the flora changes if the specimen is permitted to stand. The ideal is to arrange for the collection of the stool in the laboratory building and to examine a small portion immediately. A fairly satisfactory method is to give the patient an air-tight container, such as a small corked bottle or ½-ounce salve jar and a wooden tongue blade, with instructions to bring as much of the stool as can be picked up on the end of the stick, and to get it to the laboratory within a half-hour after the bowels have moved. If no instructions are given, the patient will valiently save the entire stool and bring it in the flimsiest of containers, often a day or two old. Occasionally it is worth while to examine a series of stools (*i. e.*, daily for six days), but in general, if a parasite is the cause of the symptoms, it will be present in enormous numbers.

The actual routine of stool examination can be limited to a minimum of four procedures, the careful observance of which will insure the detection of practically every important abnormality. A normal specimen need not require more than five minutes, certainly not any longer than a routine blood or urine examination. The steps in the technic are as follows:

1. Gross appearance—in regard to type of stool, mucus, fresh blood, or worms.

2. Examination of wet smear with microscope for amebæ, flagellates, Balantidium coli, spirochetes, ova, pus, fresh blood, epithelium, and excess food residues.

3. Same after addition of iodin, for starch residues, and to bring out the characteristics of cysts, if present.

4. Benzidin test for occult blood.

Upon sufficient indication may be added:

5. Iron hematoxylin stain (quick method) for differentiation of protozoan parasites, both active and cyst forms.

6. Brine loop concentration test for ova (Kofoid).

7. Gram stain of flora and for spirochetes.

8. Cultures for typhoid-dysentery or other group, or for yeasts and molds.

1. **Gross Appearance.**—The great majority of stools may be simply noted as having a "normal appearance." The more common abnormal appearing stools are: (*a*) the constipated, scybalous type with festoons of dark gelatinous mucus as an external coat, (*b*) the liquid stool after salts, with more or less gelatinous mucus throughout, and (*c*) the small, reddish-brown, fetid, truly dysenteric stool consisting almost entirely of blood, pus, and mucus. The obvious respect with which the last is handled is a commentary on the general lack of knowledge regarding the means of transmission of amebic dysentery and other parasitic infections of the intestine. The cysts of protozoa are the true infecting agents, the active amebæ, flagellates, or Balantidia being unable to withstand the gastric and pancreatic juices. Dysenteric stools contain only active forms and so are harmless as far as infecting others is concerned. Cysts and ova occur in perfectly normal appearing stools so that the greatest care should be used in handling these. Color is rarely of importance. The white stool following barium is now a commonplace. The presence of the barium is not a great hindrance to the detection of parasitic infections. The yellowish-white result of a milk diet should not be confused with the "clay" stool of obstructive jaundice. The voluminous, frothy, light tan stool of "pancreatic insufficiency," achylia gastrica, and of the extensively scarred colon is rarely seen. Noting the caliber is hardly of importance because the "ribbon" stools of rectal carcinoma are quite rare. A patient in my series with a diaphragmatic hernia and with the colon in the left chest passed stools of very small (lead-pencil) caliber, alternating with movements entirely of mucus. Any irritation of the colon will produce mucus, so it

is found in varying amounts in both parasitic and non-parasitic conditions of the intestine.

2. **Wet Smear.**—A wet smear is made by placing a drop of sterile normal salt solution on a glass slide and rubbing up a small piece of the stool in it until a thin emulsion is obtained. An ordinary applicator stick is best for this. Tap-water is just as satisfactory as salt solution, particularly when the findings are verified by iron hematoxylin stains of pure smears. A cover-slip is placed over the emulsion. If the smear is too thick, protozoan cysts and active flagellates will be easily overlooked. The same will occur if too much light is used or if the lenses of the microscope are not clean. A very satisfactory method is to have the microscope on an entirely different stand from the specimens and to have the smear entirely covered by the slip.

Beginners find it difficult to perceive active and cyst forms of amebæ and flagellates even when present in considerable numbers. Because of their small size few can locate them with the low-power lens. However, the only satisfactory method, and one which certainly saves eyesight, is to locate the parasite with the low-power and then identify it with the high dry lens or by special tests. There is a sheen and coloration to cysts and even active forms that is quite characteristic. When familiarity with size and shape is added, a diagnosis often can be made from the low-power appearance alone. Confirmation by further study under the high dry lens or in the stained smear should always follow before making the diagnosis absolute. If this rule is religiously followed, embarrassing mistakes in diagnosis will be avoided, especially in those early days when expectant attention animates vegetable residues into active amebæ, cysts, ova, or larvæ. While perception of the parasite when present is the first problem, differentiation between pathogenic and non-pathogenic varieties is equally important. The physician should be familiar with the characteristics of both the active and cyst forms of the three ordinary amebæ—Entamæba dysenterica, E. coli, and E. nana—and the three ordinary flagellates—giardia, chilomastix, and trichomonas. As multiple infections are fairly common, it is worth while to examine a series of stools

in "positive" cases in order to be certain which parasite is responsible for the symptoms. For the ordinary routine one entire cover-glass area of the smear should be gone over with the low power of the microscope to insure the discovery of ova as well as protozoa. Cysts of chilomastix are so small that they will probably be overlooked unless search is made with the high dry lens. Intestinal spirochetosis will certainly be overlooked unless deliberate search is made. Thus examination of a part of the slide with the high dry lens should be done even if nothing is noted with the low power. Fat and fatty acids are usually evident enough without staining, but Sudan III may be used if desired.

3. **Iodin Stain of Wet Smear.**—This simple test is extremely useful in differentiating pathogenic from non-pathogenic amebic infections when cyst forms only are present, which is the usual thing in temperate climates. Having searched the unstained wet smear, a drop of Donaldson's iodin should be run under one edge of the cover-glass, and the cover-glass moved back and forth a few times to mix the iodin with the smear. This will stain most of the cysts so that diagnosis is certain without resort to permanent stains. It is of little value in the differentiation of active amebæ or flagellates. When no parasites are present the test should still be done because it is the sole means of determining the presence or absence of starch.

Donaldson's stain originally called for eosin as well as iodin. However, the iodin alone is sufficient for practical work. It is made up as follows: 5 per cent. potassium iodid in normal salt solution, saturated with iodin.

4. **Benzidin Test.**—The method advocated by Wagner is quite simple and does not seem to have the disadvantage of being too sensitive. It is as follows: Mix a knife-point of benzidin, 2 c.c. of glacial acetic acid, and 5 c.c. of a 3 per cent. solution of hydrogen peroxid. When finished examining the wet smear with the microscope, place a little solid feces on the slide with the applicator stick and pour a few drops of the mixture over this. A greenish-blue color will appear immediately if an appreciable amount of blood is present. A negative reaction is final.

5. **Iron Hematoxylin Stain.**—Knowledge of the technic of a good permanent stain is practically indispensable in making an absolute diagnosis of amebic and flagellate infections. The internal structure of these parasites is quite characteristic both in the cyst and the active forms, so that diagnosis is simple provided a clear view is made possible. Very little can be made out in the unstained specimen, and often insufficient in the iodin stain. Likewise these may dry up before sufficient examination can be made. The permanent stain may be examined at leisure, the evidence kept for reference, and an irrefutable finality be given to the diagnosis. With experience, the necessity for using the permanent stain becomes less because sufficient evidence can be gotten from the unstained specimen or by the addition of the iodin stain to the wet smear. However, there are always cases, particularly amebic infections, which demand a permanent stain before diagnosis is certain. The iron hematoxylin stain, following the Heidenhain technic, but modified so that it can be done in fifteen or twenty minutes, is most satisfactory for this work. The procedure is as follows:

Make the smear very thin, using a tooth-pick or applicator stick, and plunge immediately into the fixing fluid. The slide must not become dry at any time during the process.

	Min.
Shaudinn's fluid, steaming (about 60° C.)	1
Iodin alcohol, 70 per cent	1
Alcohol, 70 per cent	1
Alcohol, 50 per cent	1
Water	1
Iron alum, *steaming*	2
Rinse off with water.	
Hematoxylin, *steaming*	1
Rinse off with water.	
Decolorize in iron alum, *steaming*	1
Running water	2
Alcohol, 50 per cent	1
Alcohol, 70 per cent	2
Alcohol, 90 per cent	2
Alcohol, 100 per cent	2
Xylol	2
Mount with balsam.	

When haste is important the time in the alcohols may be shortened and the 50 per cent. alcohol may be omitted. A practical method is to let the slides accumulate in cold Schaudinn's solution until a convenient time to run them through. They may stand in it indefinitely without deterioration. The best stains are invariably obtained on fresh stools. Moribund and disintegrating cysts or active parasites stain poorly. Certain methods facilitate quick work and good results, such as two sets of alcohols (one for each of the headings above), an electric hot plate for steaming the slides, and drop bottles for the iron, alum, and hematoxylin, so that the smears can be run through acid-fast stains. If heated to boiling the smear will be ruined, so absolute attention to the task is the price of good stains.

Minor difficulties beset the beginner, the most critical of which is judging the amount of decolorization. If not carried far enough, the cyst or parasite will be too black for its structure to be made out. If carried too far, the parasite or cyst will not be seen at all. The most satisfactory way at first is to follow the schedule to the second. Having obtained a good stain, it is difficult at first to locate the parasites in it unless one learns to "pick them up" with the low power and then change to the oil immersion for study. As some shrinkage results during the process of fixing and staining, a clear halo is usually present about each cyst and serves to attract the attention. Once learned, this technic proves an immense saving of time and eye-sight. The stain itself is the best means of absolute identification of both cysts and active forms of amebæ and flagellates.

The solutions used in the iron hematoxylin method require some preparation. Shaudinn's fluid is made by mixing 1 part of absolute alcohol and 2 parts of saturated sublimate. To this is added, before using, 5 per cent. of glacial acetic acid. When this is used as the fixing agent the slides must be passed through 70 per cent. alcohol colored light brown with iodin to remove the sublimate (see Schedule of Staining).

Iron alum is ferric ammonium sulphate. The pale purple crystals should be obtained and made up for use as a 2 per cent. solution in distilled water.

Weigert's hematoxylin is best. The white crystals should be obtained and made up into a 10 per cent. solution in absolute alcohol. Stand in sunshine for three weeks to ripen, or until a wine red color develops. For use mix up 1/10 stain and 9/10 distilled water.

6. **Brine Loop Concentration Test.**—The brine loop concentration test for ova is chiefly of value in detecting light cases of hookworm infection. The procedure is as follows:

(*a*) An ordinary conical glass is filled two-thirds with water and enough salt stirred in with an applicator stick to make a good brine.

(*b*) Enough of the stool is stirred into this to make a fairly thick emulsion.

(*c*) A thin layer of steel wool is pushed down from the top so as to carry the larger débris well below the surface.

(*d*) After one hour loopfuls from the surface are transferred to a slide and the preparation examined with the low power of the microscope.

The two important steps in the test are to make the layer of steel wool as thin as possible so as not to obstruct the rise of ova to the surface, and to examine the preparation within an hour. The brine gradually penetrates the ova, so that after an hour they begin to sink (Kofoid). From the clinical standpoint the greatest weakness of the test is that it is practically unnecessary. If there are enough parasites in the intestine to cause symptoms, there will usually be a great many ova in the stool and they will be detected during the routine examination of the wet smear. However, the test is of value in picking up incidental light infections and giving a clue during periods when the discharge of ova is slight. The presence of an unexplained eosinophilia is an indication for the test.

7. **Gram Stain.**—The Gram stain is of great value in the detection of spirochetal infections of the intestine. Occasionally it is useful in checking up the effectiveness of artificial implantation of bacteria, as in the feeding of acidophilus milk. When successful the flora may reach 80 per cent. Gram positive, whereas it is usually just the opposite. The percentage of

streptococci gives some idea of the extent of bacterial invasion in ulcerative colitis. Large percentages may be found in the acute dysenteries of infants.

8. **Stool Cultures.**—Culturing of stools is often disappointing, but may rule out bacillary dysentery in suspected amebic colitis. Appreciable results are obtained from fresh specimens in typhoid and paratyphoid infections. Culturing monilia-like organisms in suspected sprue may be successful, but there is reasonable doubt that they are the inciting organisms.

The handling and disposal of specimens requires attention because the material may be infectious. Access of flies and cockroaches should be prevented by keeping the specimens under bell-jars. The use of thin cardboard containers or flat Petrie dishes for soft specimens should be discouraged because they leak. The use of covered sanitary pails, immersion of known infectious material in cresol solution, and autoclaving or incineration of all specimens, should be practised.

Once mastered, the above technic, which is no more difficult than the ordinary tests of the blood and the urine, will be found to give information warranting its adoption as a routine. Other methods may give as good results, but the above at least is one method that has proved successful. The findings in 900 cases of all sorts in which I have employed this routine during the last year and a half are tabulated below.

RESULTS OF ROUTINE STOOL EXAMINATIONS IN 900 CASES OF ALL SORTS

Parasite.	Number of cases.
Amebic dysentery:	
Acute	12
Carriers or chronic	33
Giardia	32
Chilomastix	33
Trichomonas	15
Balantidium coli	1
Spirochetosis	1
Hookworm	10
Ascaris	6
Strongyloides	3
Oxyuris	1
Total	147 = 17 per cent.

CLINIC OF DR. LAURENCE TAUSSIG

DEPARTMENT OF DERMATOLOGY, UNIVERSITY OF CALIFORNIA HOSPITAL

RADIUM TREATMENT OF CARCINOMA OF THE LIP

THE treatment of carcinoma of the lip by surgical means has been comparatively satisfactory, and as a result the idea of treating these lesions by any other method has been considered heresy by most medical men. In spite of rather determined opposition radium has been used in treating cancer of the lip in a number of clinics for several years, and has gradually obtained recognition as a method of treating these lesions of at least equal value with surgery. At first radium clinics accepted only frankly inoperable, hopeless cases which were refused treatment by the surgeon. With improving technic results improved so much that borderline cases were accepted for treatment, and now most radium therapists undertake the treatment of carcinoma of the lip with the same assurance that the surgeons do. Radium has a number of definite advantages over surgery. The result is usually better from both the cosmetic and mechanical standpoint because there is less loss of tissue. This is particularly true of the moderately extensive lesions which are quite superficial. Many of the early carcinomata are seen in conjunction with a chronic cheilitis or keratosis of the entire lip which is cured along with the degenerating area when radium is used. Treatment of such a cheilitis or keratosis by surgery is unsatisfactory. In treating the precancerous conditions and those which are on the borderline of malignant degeneration radium is supreme, a moderate dose clearing the lesion whether it be precancerous or actually cancerous, with but little discomfort to the patient. In these doubtful cases a considerable

disadvantage is the lack of microscopic confirmation of the diagnosis, with the result that we will cure a certain number of early cancers, taking credit only for the cure of keratoses. Of course the opposite condition will occur. The chief disadvantage of radium in the treatment of malignancy of the lip is that it takes so long for the period of reaction and subsequent healing. For this reason patients that we do not expect to be able to keep track of for a reasonable period of time are usually referred to the surgical clinic. Published statistics show that the chance of cure for any particular stage of the disease is nearly equal for the two methods of treatment.

During the past three years we have been treating carcinomata of the lip with radium. Three typical cases will be demonstrated, with a discussion of their treatment.

Case I.—W. T. This man presents a dime-sized, crusted ulcer with heaped-up edges, just to the right of the midline of the lower lip (Fig. 226). The appearance suggests a rodent ulcer, but this type of growth is rare on the vermilion border of the lip and this is certainly a prickle-cell carcinoma. The patient says that it has been present for two years, growing slowly. There has been no previous treatment other than simple ointments. On palpating the lesion it is found to be hard and only slightly indurated. The musculature of the lip is apparently not involved. There are no palpable lymph-nodes. There is no evidence of a chronic cheilitis or Keratosis buccalis as a precursor of the cancer. The patient is a heavy pipe smoker and that may have furnished the determining factor for the development of the neoplasm. Adequate radium therapy will almost surely cure this type of lesion. He was in the clinic yesterday and the involved area was treated with a half-strength 10-milligram plaque of radium screened with 0.3 mm. of brass and one layer of rubber-dam for two hours. At that time we made an impression of the lip with dental modeling compound which fits his front teeth. On the surface of this mold which approximates with the lesion, we have imbedded three silver tubes of 0.5 mm. silver containing a total of 143 mc. of radium emanation. The tubes

are placed so that one is a little posterior and one a little anterior to the ulcer, while the third is just over it when the applicator is held in place. We will have him hold this "dental compound applicator" in place for an hour. In addition to this intensive surface radiation we will bury 4 unscreened tubes of emanation containing a total of 4.3 mc. into the mass. These are fine capillary tubes, each about 3 mm. long by 0.25 mm. in diameter, and are loaded into the lumen of special needles similar to

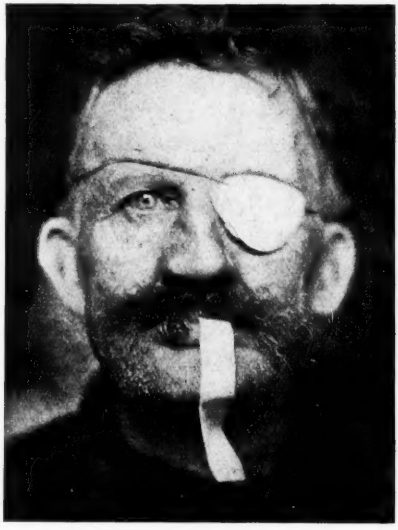

Fig. 226.—W. T. Carcinoma of the lip; moderate induration, no glands palpable.

ordinary intraspinous needles, which are thrust into the tumor mass. The tubes are expelled into the tissue by thrusting home the stilet with which each is fitted. Figure 227 shows the method employed, the black dots indicating the other points of insertion. This type of radium therapy was suggested by Duane and worked out by Janeway and Quick at the Memorial Hospital in New York. It is the method of choice in treating many types of tumors, usually in conjunction with some type of surface radia-

tion. The tubes gradually lose their radio-activity, reaching zero in about thirty days. They are so small that there is but little foreign body reaction, though at times they cause little fibrous nodules that are difficult to tell from remaining cancer tissue. They permit of an even radiation of the depths of the growth. When they are not available, the next best method is

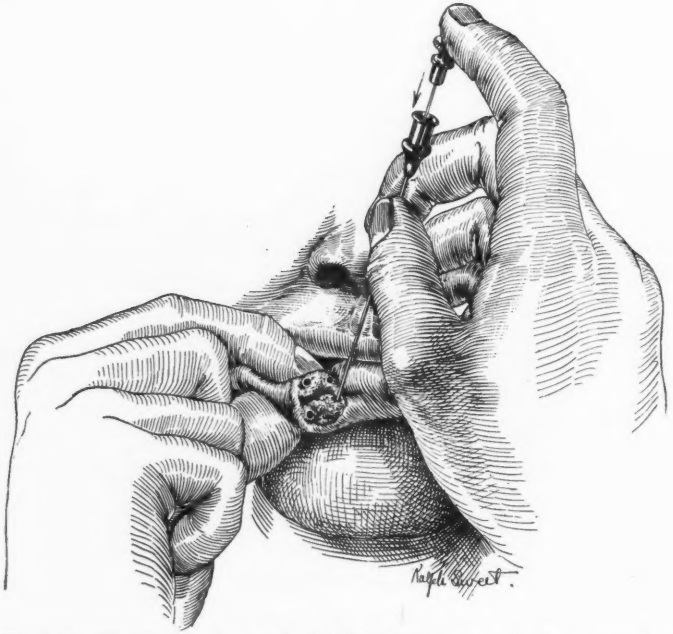

Fig. 227.—W. T. Showing method of inserting "bare tubes" of emanation into carcinoma of the lip.

the insertion of steel needles containing radium element, which are withdrawn after a suitable exposure. In about one week a violent reaction will commence. The lip will look as if it had been treated with a red-hot iron. It will be moderately painful, but will not be bad enough to interfere with the patient's work. The reaction will fade in about three weeks and the lip will be entirely healed in six weeks to two months from the time of

treatment, leaving a soft scar with possibly a small notch, not large enough to bother him. We warn the patient fully as to the nature of the reaction and instruct him to use nothing but plain or borated vaselin. There may be a slight reaction on the upper lip from the effects of the bare tubes. We will watch the lymph-nodes, though they are not likely to be involved in this case. He will report for observation in six weeks.

Case II.—P. F. This patient is a man sixty-four years of age who has been under treatment for the past four months

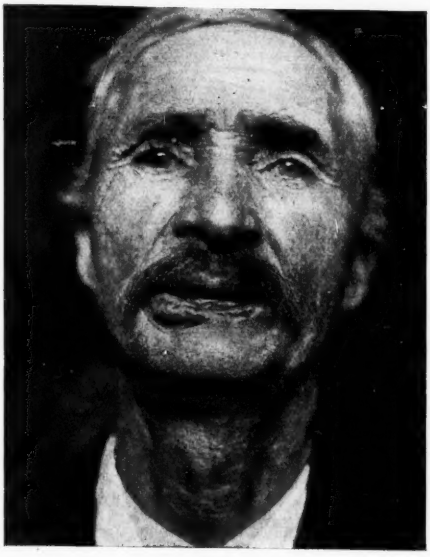

Fig. 228.—P. E. Carcinoma of the lip; four months after starting treatment.

(Fig. 228). When he first entered the clinic he presented an extensive carcinoma of the lip of the papillomatous type (Fig. 229). It had been present for about fifteen years and had been treated three times with arsenic paste during the past year and a half. It was of doughy consistency involving the lip down to the gum. There were no palpable lymph-glands. He had been a heavy

smoker. The history proves that this is a relatively benign type of growth and one that should respond to proper therapy. His first treatment in this clinic consisted of 271.3 mc. of emanation in 5 silver tubes in a "dental compound applicator" held in place for one hour. Seventeen days later two tubes of 30.1 and 32.9 mc., screened with 0.5 mm. of silver and 1 mm. of rubber, were held for one hour in each of two positions. Two weeks later he received 6 "bare tubes" of emanation totaling 7.6 mc. inserted

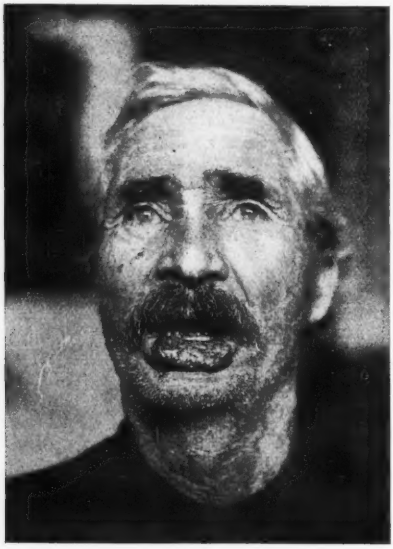

Fig. 229.—P. E. Carcinoma of the lip; before treatment.

in the mass. It gradually decreased in size, and six weeks later 2 "bare tubes" totaling 2.2 mc. were inserted into a small nodule remaining in the center of the lip. That was six weeks ago. The right side of the lip is quite soft, but the left side presents a small, waxy, hard nodule which is probably carcinomatous. There is also a small thickened area in the middle of the lip which is suspicious. We will apply a tube containing 40 mc. screened with 0.5 mm. of silver and 1 mm. of rubber to the

central area for one hour and will bury 2 "bare tubes" totaling 1.3 mc. into the nodule on the left side. There is still no evidence of cervical involvement, and if they do not develop the chances for a cure are good. Here again the advantage of radium therapy over surgery is demonstrated in that the only tissue loss is of malignant tissue and not of normal.

Case III.—J. S. This man, fifty-four years of age, has a very superficial ulcer on the middle portion of his lower lip which he says has been there for two years (Fig. 230). The ulcerated area

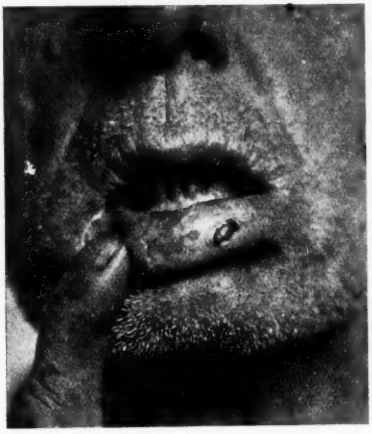

Fig. 230.—G. S. Carcinoma of the lip; early and associated with keratosis.

is roughly circular, 1½ cm. in diameter, and to the left of it is an area of keratosis. It seems probable that the whole thing was a keratosis and that the degenerative change of a portion of it has occurred relatively recently. He gives a history of having had a similar lesion treated four years ago, probably with arsenic paste. The prognosis for an early cancer of this type is even better than in Case I, under adequate radium therapy. We will give the ulcerated area intensive radiation, not failing, however, to treat the precancerous keratosis. Today he will be treated with three 0.5 mm. silver tubes containing a total of 102.9 mc. of

emanation arranged as in Case I, for one hour. Tomorrow we will apply a half-strength 10-milligram plaque which is large enough to cover the keratosis, screened with 0.3 mm. of brass for one and a half hours. On the third day a full strength 10-mg. plaque will be applied to the ulcerated portion for one and a half hours. In a case of this kind the insertion of "bare tubes" is not necessary and not desirable because it would increase the reaction and also the amount of scarring. His reaction will start in about ten days and will be entirely healed in about four weeks, forming an almost imperceptible scar, with no tightening of the lip.

CLINIC OF DR. HARRY SPIRO

CARDIAC CLINIC, STANFORD UNIVERSITY

CHRONIC AORTITIS—A BRIEF DISCUSSION OF ITS CLINICAL SIGNS AND OF THE USEFULNESS OF AN ANGLE FINDER DURING THE FLUOROSCOPIC EXAMINATION OF THE THORACIC AORTA

AT our previous session we discussed the subject of arteriosclerosis, and as a part of that same process we will now briefly discuss chronic aortitis and its complications, again calling your attention to the fact that the media of the smaller arteries is composed principally of muscular tissue, and that of the aorta principally of elastic tissue. This difference in structure is due to the different functions the two systems of vessels are called upon to perform—as an entire system of arteries like the arteries of the skin contract in order to furnish more blood to the intestinal tract, or the intestinal arterial system may contract so that the muscular system may for a time have more blood. There is only a limited amount of blood in the circulation, so it must be distributed according to the needs of different parts of the body. The aorta is only passively involved in this interchange, therefore it is lacking in muscular tissue; but it must stretch and return to its former shape, so its media contains sufficient elastic tissue. This difference in structure and function may in part account for the difference in frequency with which the arteries and aorta are attacked, and for some of the modifications of the degenerative processes occurring in the latter. The smaller arteries may thicken as a result of a hypertrophy of their muscular tissue—a thickening of the walls of the

aorta is generally the commencement or continuance of a degenerative process.

If there are visible signs of general arteriosclerosis, such as thickened or visibly pulsating radials, tortuous and visibly pulsating brachials, markedly tortuous and thickened temporals (all temporal arteries are tortuous), you may be sure that the aorta also is damaged, yet you may have extensive and often serious damage to the aorta and practically no visible signs in the peripheral arteries.

The question as to whether the arterial degeneration commences in the intima—an endarteritis—or in the media is still a matter of dispute. Reason suggests that the media, on account of the peculiarity of the blood-supply, is first attacked. However, Ophuls, of Stanford, has shown a piling up and so a thickening of the intima before any evidence of disturbance can be seen in the media, but as the intima gets its nourishment from those vessels which penetrate into the media, irritants could be carried to the lower layer of the intima and thus cause a thickening of this layer first.

The degenerative processes in the aorta may involve one or all of its layers; it may be limited to points as big as a pinhead, or extend over various sized areas, and may extend from one end of the aorta to the other. The degeneration may be of any type, from simple connective-tissue proliferation to that of calcification. Ulceration with necrosis of the intima is rare. Invasion of the body by any pathogenic germ may produce an aortitis. Certain bacteria, however, seem to have a preference for this vessel. The frequency of luetic aortitis is often attributed to the alleged fact that the Spirochæta pallida prefers to attack damaged areas; but most likely, as Dickson of Stanford says, "it is because of the fact that the aorta is so frequently damaged that we look for the luetic germs. We know how frequently the meninges are attacked by syphilis, yet there is no reason to suspect previous damage there."

When one thinks of the strain the aorta is constantly under it is difficult to conceive of this vessel enduring to more than middle adult life without showing some evidence of damage, and,

as a matter of fact, it is rare to see a perfect aorta in a person over forty years of age. The first part of the aorta—the ascending aorta—must withstand a terrific strain.

Compare the heart, with its thick muscular walls (built for work and to withstand strain), to that of the aorta, with its lack of muscle and thin walls, and then consider the fact that at a certain stage of the cardiac cycle—namely, toward the end of systole—the pressure in the aorta nearly equals that within the heart, and you will agree that such a strain is frequently sufficient to account for chronic aortitis. Experimentally, a normal aorta can withstand enormous pressure and show no damage, but experiments carried on for a few seconds can never equal the strain of years. The aorta must degenerate—first, if the patient lives long enough; second, if the pace is swifter than it should be; third, if various toxic or irritant substances accumulate in the blood. If this is true, it is difficult for the luetic germ to find an undamaged aorta, and we know how difficult it is for a damaged aorta to contend with a germ as persistent as the Spirochæta pallida.

A more or less damaged aorta may perform its functions without showing symptoms, provided the peripheral pressure does not permanently rise too high. If it does, dilatation will ensue, and if the dilatation is localized, symptoms appear early; while if long stretches of the artery dilate symptoms may be delayed.

If it is true that it is so rare to find an undamaged aorta, then manifestly it is possible for the majority of patients to go through life without showing symptoms directly referable to it. Then what is it that attracts our attention to the aortic region? In the majority of cases it is the symptom of pain. It has been frequently repeated, but it still is a curoius fact how much the patient's position in life has to do with the symptoms of pain from aortitis. A great majority of cases attending the clinic and showing damaged aortas do not complain of pain.

Yet, in certain races, like the Jews, and in certain occupations, like that of physicians or financiers, where mental strain is prominent, comparatively slight damage to the aorta may give

rise to pain, and pain of such severity that apparently it kills—typical cases of angina pectoris. At other times the pain is not typical of angina pectoris, but is of a dull, annoying nature, often limited to the right of the sternum. Again, many patients are awakened from a sound sleep with an attack of pain under the sternum, or complain of a crushing, vise-like grip compressing their chest, so direct relation of pain to exercise is not a constant feature of the disease. Time after time you may examine a patient and find a normal blood-pressure, but if you examine this patient during an attack of pain, you may see the systolic pressure rise from 140 to 240, and the diastolic from 80 to 120 or 130, and almost immediately fall to normal when the attack is over. Often in cases of angina pectoris associated with hypertension (but not during an attack) you will find that the high systolic pressure has dropped 30 to 40 points shortly after the patient assumes a recumbent position, thus showing a very labile type of pressure curve—one evidently easily affected and sufficient to cause pain by suddenly overstretching a damaged aorta. Pain under the sternum, coming on after meals and moderate exercise (the so-called abdominal angina), may also be due to this temporary rise in blood-pressure. Pain between the shoulders, particularly in the region of the fourth to the eighth dorsal vertebra, persistent for weeks or months, should make us suspicious of an aortitis of the descending aorta.

Naturally, if we have a localized dilatation of the vessel and so a pressure on adjacent organs, we will get such signs as: Difficulty in swallowing—pressure on esophagus; brassy voice—pressure on trachea; loss of voice—laryngeal nerve pressure; engorgement of face—pressure on the superior vena cava or its branches, etc.

The finding of a difference in size between the right and left radial or brachial arteries is also important. The presence of a tracheal tug is an unreliable sign. Abnormal areas of pulsation on the chest is a reliable sign, and should be looked for in the second and third intercostal space to the right of the sternum; pulsation in the suprasternal notch frequently signifies a lengthened aorta due to aortitis. A thrill felt to the side of the spine

in the region of the second to eighth dorsal vertebra is nearly pathognomonic of an aneurysm of the descending aorta. By careful percussion you will frequently elicit an increased area of dulness to the right or left of the sternum in the second and third intercostal space; this dull area may extend only 1½ to 2 cm. to the right of the sternum, but it is sufficient to create a suspicion of dilatation of the ascending aorta due to a chronic aortitis. While there are no pathognomonic sounds to be heard, still accentuation of the second sound in the second intercostal

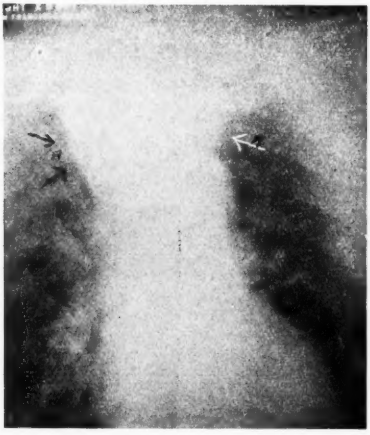

Fig. 231.—*A*, Substernal goiter with signs and symptoms of aneurysm of arch of aorta.

space to the right of the sternum is a frequent accompaniment of aortitis, even if no hypertension is present. So also a systolic murmur, or even roughening of the first sound, in the second intercostal space to the right is confirmative evidence.

We will now present a few cases to you, dispensing with the history as much as possible. First, in order to place you on your guard, I will show you this almost typical case:

He has every sign of aneurysm according to your text-book: He has a "brassy" voice, difficulty in swallowing, marked pain under the sternum, and dilated veins over the chest. Here is

a radiogram of his chest (Fig. 231). Note the large mass (Fig. 231, *A*) which shows at the junction of the ascending aorta and transverse arch.

This is a picture of a "typical aneurysm" of this part of the aorta; and such has been the diagnosis tacked upon him in many

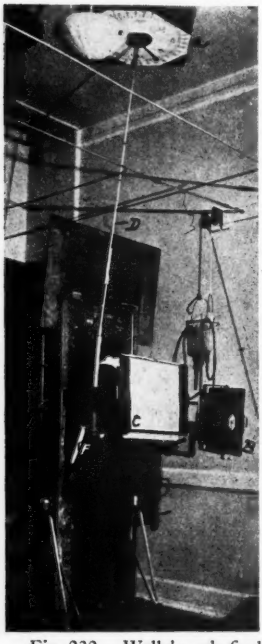

Fig. 232.—Wells' angle finder: *A*, Circle of figures; *B*, screen; *C*, table and paper for marking orthodiagrams; *D*, removable rod; *E*, set screw; *F*, belt for attaching patient to rod.

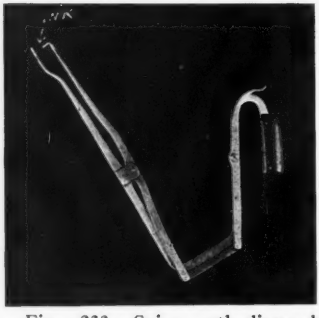

Fig. 233.—Spiro orthodiagraphic skin marker. The examiner can reach under and back of the screen and mark on the skin, etc.

of the prominent clinics of this country. It probably was this patient's luxuriant growth of whiskers which caused the downfall of so many clinicians, so we will push his curtain aside, and then try to elicit a tracheal tug. If you try hard enough (this patient has such a short neck that it is difficult), you will provoke a

cough, and at that moment you will note a large protuberance on the right side of his neck which you can almost grasp, but which disappears at once. During the fluoroscopic examination this mass could be seen to "pop" away from the arch of the aorta every time the patient coughed violently, so this is a substernal goiter and not an aneurysm.

As I believe that an early diagnosis of chronic aortitis (and by "early" I mean long before there are clinical signs) can only be made by a thorough fluoroscopic examination backed up by radiograms and orthodiagrams, we will continue this clinic in the fluoroscopic room.

Figure 232 represents an apparatus which was invented in 1922 by Dr. Wells, who at that time was a senior student at Stanford. Its object is to show you the exact position or angle in which your patient is standing while you are screening him, and the advantage of knowing the exact angle in which your patient is being examined is based upon the fact that at certain angles different chambers of the heart show to better advantage, and frequently enlargements or localized dilatations can only be seen or differentiated at certain definite angles, depending upon the nature of the case. With this apparatus you can tell the exact angle in which your patient is standing by reading the figures on the ceiling. The patient is attached to a removable rod (Fig. 232, *D*), and this rod is attached to an arrow pointing to the figure on the ceiling (Fig. 232, *A*).

By inserting my orthodiagraphic skin marker (Fig. 233) under the screen (Fig. 232, *B*) we can outline patient's heart, etc., on his chest, or if we wish to measure the exact size of the heart or aorta, we can insert this table (Fig. 232, *C*), which was suggested by Dr. Chamberlain and Dr. Newell, between the patient and screen, and mark the exact outline on this paper roll.

Figures 234 and 235 show the angle finder which I use in my office. It looks more elaborate than the Wells apparatus, but we have a perfect control of our patient. The angles are read on the bottom of the revolving platform (Fig. 234, *A*), and orthodiagrams are marked on the screen by first inserting a celluloid sheet over the lead glass (Fig. 234, *E*). The *x*-ray

tube in my apparatus moves independently of the screen. I would not care to practice cardiology without the use of one of these "angle finders," because the fluoroscopic examination becomes far more accurate, and we are often able to uncover cardiovascular defects that would probably otherwise be missed.

Our next patient is a comparatively young man of thirty-six, complaining of an indefinite dull ache under the sternum. His blood-pressure is 155/80; radials, etc., are soft; percussion

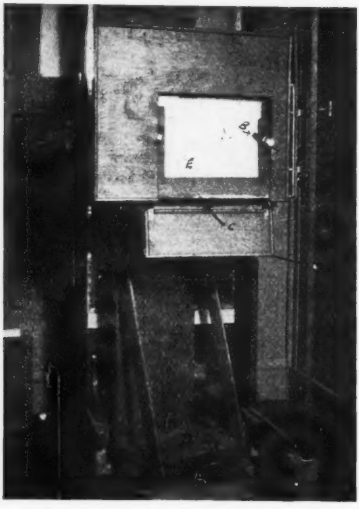

Fig. 234.—Spiro angle finder: *A*, Platform, showing angles and degrees; *B*, spring clip for holding celluloid; *C*, slot for inserting orthodiagraphic skin marker.

shows that substernal dulness extends 2 cm. to the right of the sternum in the third and fourth intercostal space—the area of cardiac dulness apparently not increased. Upon placing this patient behind the screen (Fig. 236) we note (Fig. 236, *A* and Fig. 248, diagram II) that the arch of the aorta is high—reaching to the clavicle. How does it get there? Normally it should not reach much beyond the middle of the second intercostal space, so this aorta is lengthened—a very frequent finding in chronic

aortitis; yet I have seen it in young persons in whom I was positive there was no arteriosclerosis, merely a "family or inherited type of aorta." We differentiate these cases also by examining the nob of the aorta, which is the shadow of the arch of the aorta, measuring its length, etc., according to the method of Vacquez and Bordet. The thicker and stiffer the artery, the more prominent this nob becomes. In this case the nob is not more prominent than the average, and its shadow

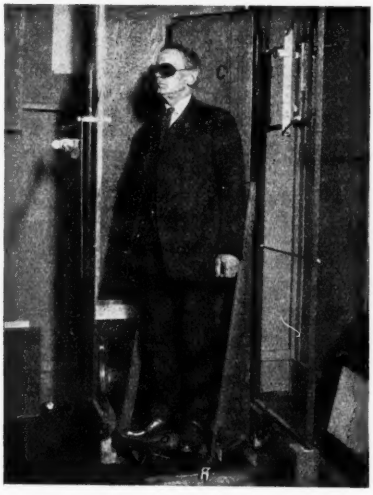

Fig. 235.—Spiro angle finder (screen removed): *A*, Platform showing angles; *C*, sliding back rest; *D*, revolving platform; *F*, light in series with switch.

is not denser, showing that an extensive aortitis is not present. In the series of cases which will be presented to you today we will see that the more advanced the aortitis, the darker the shadow cast, and so we recognize an "old man's aorta" (Fig. 248, diagram IV) by the prominence of the nob and the density of the shadow. The above is not nearly as well brought out on a radiogram as it is during the fluoroscopic examination. If this is characteristic of an "old man's aorta," it must be a common finding, which does not detract from the possibility of an *x*-ray

diagnosis of chronic aortitis. On the contrary, it proves that an aortitis can be present without showing symptoms.

STUDENT: Is chronic aortitis ever a normal process?

DR. SPIRO: Yes, as normal as death. To be avoided as long as possible.

We will now rotate the patient to the right anterior oblique position (right shoulder toward the screen), and place him at an angle of 40 degrees (Fig. 237). We see the spine rotated toward patient's right and the aorta to the left (Fig. 237, *A* or Fig. 248, diagram VI). We now have the shadow of the ascending aorta

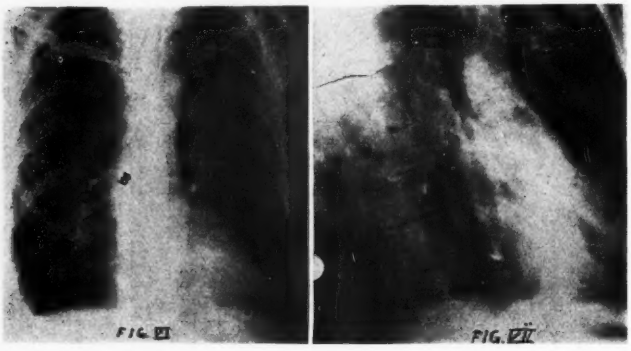

Fig. 236. Fig. 237.

Fig. 236.—*A*, Lengthened aorta; *B*, bulge in ascending aorta.

Fig. 237.—Right anterior oblique position at 45 degrees (arm raised): *P. C. S.*, Posterior cardiac space; *A*, ascending aorta in position for measuring.

partially separated from that of the descending aorta, and in the proper position for accurate measurements. We have rotated the patient until both edges of the ascending aorta are distinct. You must not rotate patient too much or too little, or the edges of the ascending aorta will blend with the surrounding tissue, and make it difficult to judge its size. Be sure to make note of the angle at which patient is standing for future reference.

Kilgore has given us figures showing the average size of the ascending aorta at various ages, and deviations from this, as a rule, speak for a widening of the aorta—chronic aortitis.

In order to eliminate exaggeration of outline we must discount the effect of the divergent rays from the *x*-ray tube, and use only the so-called parallel ray. An easy way to follow the parallel ray is to first center your tube; then directly opposite the dead center of the target in your tube place a pinhead of lead (on our apparatus this is attached to and behind the screen). By following this pinhead of lead as we move the tube around the aorta, we can make an orthodiagram of the aorta. For our purpose we will call this pinhead of lead a "focal spot."

Measurement of this patient's ascending aorta in its upper part shows it to be well within the average for his age.

We now rotate the patient back to the frontal position, and the angle finder shows us that the patient is straight—a very important point—because an unknown rotation of a few degrees, a rotation that you probably would not notice without the angle finder, may lead to many errors. We now notice above the right auricle in the region of the third intercostal space a slight bulge (Fig. 236, *B* and Fig. 248, diagram V). This is definitely pathologic. The ascending aorta may be visible to the right of the sternum and not be pathologic, but there should be no localized dilatation (frequently tortuous aortas make a wide turn which looks like a dilatation, but observation at proper angles will clear up this point). This bulge is caused by a weakening of the walls of the aorta, due to strain, but it would not have weakened and stretched if there was not an aortitis present. A bulge like this is a frequent finding in hypertension, and also in cases of aortic insufficiency, in which case a violent pulsation is often noted at the bulging point.

When the aortic valves are intact the peripheral resistance, as measured by the diastolic pressure, is a great deal higher than it is in cases of aortic insufficiency. One of the causes of this low diastolic pressure in aortic insuffiiency is nature's attempts to compensate for the defect. If the peripheral pressure was high, the heart naturally would have a great deal more work to do in keeping the column of blood moving, and more blood would be forced back into the left ventricle than is the case where the diastolic pressure is low. However, in aortic insufficiency the

left ventricle contains more blood at the end of the diastolic period than it should, so this results in a great deal more blood being forcibly thrown into the aorta at each systolic contraction of the heart, thus making an unusually heavy strain on the first part of the ascending aorta, which dilates if previously damaged. Kilgore has called attention to the fact that a bulge such as this frequently accompanies "luetic aortitis." It frequently is the only sign to account for attacks of angina pectoris.

The patient is now carefully rotated to the left anterior oblique position (left shoulder toward the screen). Spine is seen passing toward patient's left and the shadow of the aorta toward the right (Fig. 248, diagram VII). This is an important maneuver. It is nearly impossible to place the patient in any position in which the descending aorta stands out as clearly as the ascending aorta does, so it is difficult to measure the width of the descending aorta accurately. After examining many cases I have come to the conclusion that the left border of the descending aorta merges or lines up with the left border of the spine at an angle of 25 degrees (Fig. 248, diagram VII), which is the limit of a normal case. If it lines up at a greater angle than 25 degrees I would not hesitate to say that the descending aorta is too wide, due to a chronic aortitis of this part of the vessel.

Now look at the patient's ascending aorta (Fig. 238, *A* and Fig. 248, diagram XII), patient is still in the left anterior oblique position at an angle of 45 degrees, and note that the bulge in the ascending aorta has greatly increased in visibility. The left anterior oblique position is the most favorable position in which to place your patient for observing abnormalities of shape of this part of the aorta, but not for measuring the diameter, because in this position all lateral bulges of the ascending aorta are exaggerated. Bulges in a posterior direction become visible in the posterior cardiac space (Fig. 238, *C*). Note how very wide the ascending aorta appears in Fig. 238.

The patient is now rotated until his back faces the screen; and on rotating him to the right, namely, the right posterior oblique position (back of right shoulder toward the screen) we now can see the descending aorta better than in any of the frontal

positions. If the descending aorta is thickened or too wide, its entire length is frequently visible, but not clear enough for accurate measurements (see Fig. 243 and Fig. 248, diagram X).

Thus, we have a method of quickly judging the size of either the ascending or descending aorta. I offer a diagnosis of chronic aortitis if, according to the above method, the ascending or descending aorta is wider than normal, even though there is no bulge present.

One must be careful in judging the angle at which the descending aorta clears the spine, because an elongated arch may

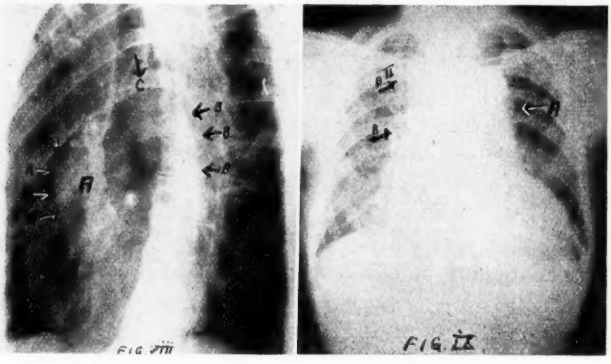

Fig. 238. Fig. 239.

Fig. 238.—Left anterior oblique 45 degrees. Note wide ascending aorta (*A*) with a bulge in its first part, and the descending aorta within the shadow of the spine (*B*).

Fig. 239.—*A*, Dilated descending aorta; *B*, ascending aorta; *BII*, innominate artery.

so displace the descending aorta that it has a wide angle of disappearance, even though its diameter is narrow. If the latter is the case, by placing the patient in the right posterior oblique position we will be able to see a long narrow arch and not a wide descending aorta (see Fig. 248, diagram IX).

Radiograms are always needed in order to observe finer details; so whenever, during a fluoroscopic examination, a part of the aorta appears abnormal, a cassette containing film and intensifier is placed on the screen holder (Fig. 234) and without

moving the patient from the angle in which he has been standing, a radiogram is taken.

Our next patient is a rather healthy looking Chinese, who has been complaining of pain between the shoulders for over two years. Upon placing him behind the screen you at once note that the aorta is abnormal (Fig. 239). You see a large gray shadow (Fig. 239, *A* and Fig. 248, diagram III) to the left of the black shadow of the arch of the aorta, but blending with it. If this gray shadow was not as large as it appears to be, there would be no special reason to comment upon it. The gray shadow is that of the descending aorta. Its increased visibility is due to one of three things:

(1) It may be the descending aorta displaced toward the left—this could hardly be the condition in this case because the shadow is entirely too wide.

(2) It could be a dilated aorta—a very probable condition. By rotating him to the left anterior oblique position the descending aorta remains visible to the left of the spine, even at an angle of 45 degrees (Fig. 248, diagram VIII). This is an exceptional finding, as it is rare to see an angle of disappearance as wide as this, unless due to aneurysmal dilatation.

(3) It could be an aneurysm, and on rotating him to the right posterior oblique position at 45 degrees the lower part of the descending aorta (Fig. 240, *A* and Fig. 248, diagram XI) becomes visible, and we now see in its entire length a fusiform aneurysm of the descending aorta.

Many roentgenologists prefer to take radiograms of the descending aorta by placing the patient in full lateral position (Fig. 241 is a radiogram of this case in full lateral position).

This shows the confirmatory proof of aneurysms, viz., The edge of the spine is eroded, but the descending aorta (Fig. 240, *A*) becomes lost in the shadow of surrounding structures, and so the aneurysm may be missed.

A case such as this would be sufficient justification for the use of an angle finder, because it has helped you to be sure of your findings, but the Chinese has more to show you. In the frontal position (Fig. 239, *B*) we see the ascending aorta pro-

jecting too far to the right of the sternum, and in the region of the sternoclavicular junction you see a suspiciously large shadow. Is it the first part of the arch of the aorta which is dilated? By careful rotation to the left anterior oblique position at an angle of exactly 25 degrees we see a black nob-like mass about as large as a 25-cent piece, and to the right of this is a fairly bright area of light. The nob pulsates, and corresponds to the position of the innominate artery, and the light area is the trachea. There must be a dilatation of the innominate artery; otherwise

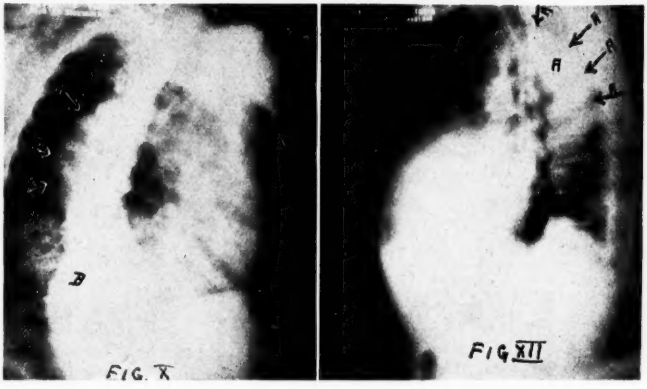

Fig. 240. Fig. 241.

Fig. 240.—Right posterior oblique 45 degrees: *A*, Fusiform aneurysm of descending aorta; *B*, left ventricle.

Fig. 241.—Full lateral position, same case as Fig. 240: *A*, Descending aorta, no aneurysm visible in this position.

you would not see it, and if you had not used the fluoroscope you could not have made the diagnosis; radiograms would not have showed enough contrast.

Here is another case—the Chinese's white brother—but with absolutely no complaint referable to his cardiovascular system. A radiogram taken of the chest (Fig. 242) again shows the gray shadow (Fig. 242, *A*) to the left of the black (Fig. 242, *B*)—the former we know to be the descending aorta. This gray shadow can be followed behind the heart (Fig. 242, *C*). You can

hazard the guess that there is an aneurysm of the descending aorta, but if you wish to be sure place your patient in the right posterior oblique position (Fig. 243).

In this case, exactly at an angle of 45 degrees, the shadows separate—that of the heart passing to the right, the spine in the middle, and the descending aorta to the left (Fig. 243, *A* and Fig. 248, diagram XI), and now we plainly see that we are safe in our diagnosis of aneurysmal dilatation of the descending aorta. This patient is lucky to have had lues as a cause of his aortitis

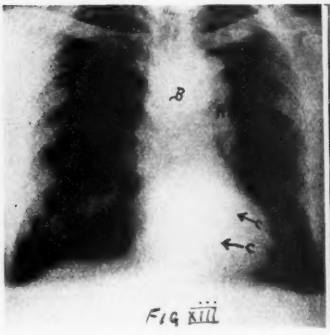

Fig. 242.

Fig. 243.

Fig. 242.—*A*, Dilated descending aorta; *B*, ascending aorta; *C*, shadow of aneurysm of descending aorta.

Fig. 243.—Right posterior oblique 45 degrees: *A*, Aneurysm of descending aorta.

because we now have some hope of stopping further progress of his disease.

Schussler, of Stanford, has conclusively proved that Pollitzer's and Ormsby's method, viz., the use of full doses of neoarsphenamin at very short intervals is safe and effective. He gives 0.6 to 0.9 gm. at twenty-four-hour intervals for three doses, followed by a month of mercury and iodids and a month's rest. This course is repeated until the Wassermann test has been negative for four months. Dr. Hewlett has suggested that our cases of luetic aortitis in particular should receive more energetic treatment. I believe in the use of iodid of soda intravenously

in cases not definitely luetic—the more I use it the more enthusiastic I become. Iodid of soda can also be used for luetic aortitis in conjunction with other remedies.

Our last case shows a dilatation of the ascending aorta (Fig. 244, *A*). The bulge (Fig. 244, *A*) is much more extensive than the previous one, but probably never will develop into a saccular type of aneurysm. In the right anterior oblique position (Fig. 245) we hardly need to measure the diameter of the ascending aorta (Fig. 245, *A*), for we can see that the vessel is

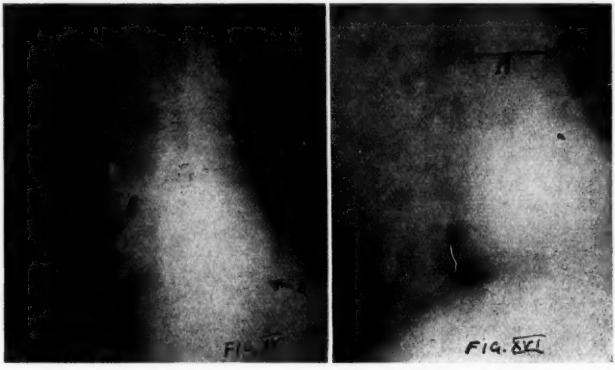

Fig. 244. Fig. 245.

Fig. 244.—*A*, Dilated ascending aorta; *B*, shadow of apparently dilated descending aorta.

Fig. 245.—Same case as Fig. 244. Right anterior oblique at 45 degrees shows very wide ascending aorta.

too wide. Patient did not have lues, but his pain has decreased 75 per cent. by the use of iodid of soda.

On placing this patient in the left anterior oblique position at an angle of 45 degrees (Fig. 246) no bulge is seen, and in the right posterior oblique position at an angle of 50 degrees, the descending aorta is well within the shadow of the spine, showing hat the descending aorta is not dilated (Fig. 246).

The point we now wish to make is that even though the aorta in persons over forty is generally damaged, the damage

may be so slight as to be unrecognizable; but it it is possible to show by a system of measurement and observation in favorable angles that the aorta does not conform to be normal type; that there is an increase in width, length, or density, or the edges are rough; then we have demonstrated the probability of pathology being present, and we should not wait for symptoms, but the patient should be urged to place his house (his body) in order.

I feel strongly on the question of luetic infection of the aorta. To acquire syphilis is an expensive undertaking, but even

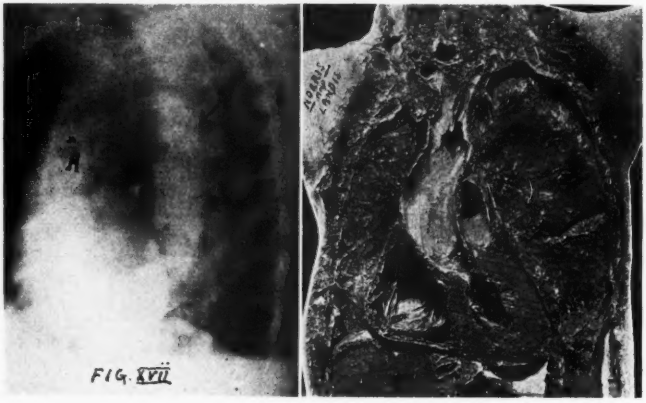

Fig. 246. Fig. 247.

Fig. 246.—Left anterior oblique at 45 degrees: *A*, Wide ascending aorta; *B*, descending aorta wall within shadow of spine.

Fig. 247.—Probable anatomic findings in case from Fig. 244: *A*, Dilated ascending aorta.

so it would not increase the expense to an unjustifiable extent if every patient with primary lues were to have radiograms taken of the aorta, to be filed away for reference, and repeated about once a year. We know what a silent area the aorta is, how frequently lues affects it, and that this infection may yield to antiluetic treatment if discovered in time. Careful measurement and observation at proper angles may provide that timely indication.

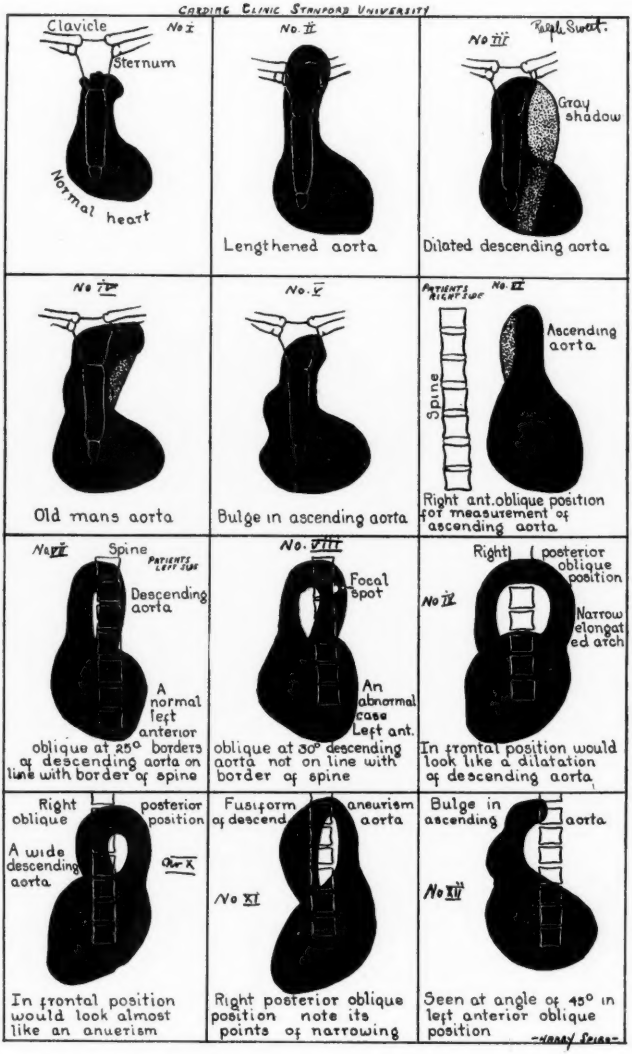

Fig. 248.—Series of diagrams referred to in text.

INDEX TO VOLUME 6